

DICTIONARY

OF

THE ECONOMIC PRODUCTS OF INDIA

BY

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(ASSISTED BY NUMEROUS CONTRIBUTORS)
IN SIX VOLUMES

VOLUME III

Dacrydium to Gordonia



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PREFACE to Vol III

SUBSEQUENT to the appearance of the first volume of this work, the Editor was engaged for nearly two years, in connection with the Colonial and Indian Exhibition. On his return to India in April 1887, he resumed the Dictionary work, and the second volume was published in little more than a year from that date. During the course of preparation of that volume however, the Government of India considered it desirable to modify materially the scope and character of the work, enlarging it in some directions and abbreviating it in others. It was, for example, deemed unnecessary to give botanical descriptions of the plants dealt with, and thought advisable to practically omit all imported articles of Indian trade to discontinue reference to Ceylon products, when not directly connected with India, and also to reduce the number of tables given in statistical accounts of trade. A minor departure was at the same time enjoined in the adoption of the third person, in preference to the first but that would in any case, have been necessitated for, shortly after the second volume had been completed, the Government of India was enabled to render invaluable aid by the deputation as collaborateurs of Mr J F Duthie, Director of the Botanical Department Northern India, and shortly afterwards of Dr J Murray, of the Indian Medical Service. The Editor has now to express his warmest thanks to these gentlemen for the able assistance they have rendered. He need only add that the respective share taken by each contributor is indicated by the appearance of his name on the right hand top corner of the pages.

During the preparation of the third volume the Editor's task was indeed a pleasant one for, the entire material of the Dictionary having been brought together and arranged by him some years ago, his editorial work consisted in seeing that the elaboration of the portions entrusted to his collaborateurs was on the plan laid down by the Government of India.

It may perhaps be admitted that the third (and perhaps also the second) volume manifests a considerable improvement on the first. This was to be expected, since the co-operation of Mr Duthie and Dr Murray ensure greater accuracy, through doubtful points having invariably been decided in consultation. A numerous circle of correspondents have also been consulted, amongst whom may be specially mentioned Dr George King, Superintendent of the Royal Botanic Gardens and Dr D Prain, Curator of

the Herbarium, Calcutta Mr H Medlicott (and his successor Dr V King), Superintendent of the Geological Survey, and the authorities of the Imperial Museum The Directors of Land Records and Agriculture in the various provinces by official requisitions through the Revenue and Agricultural Department of the Government of India, have given the Editor much useful information on various subjects On trade questions invaluable assistance has been rendered by Mr J E O'Connor, Assistant Secretary to the Government of India, Finance and Commerce Department, by the Chambers of Commerce, and by many mercantile experts and planters throughout the country to all of whom the Dictionary is indebted for many of its most useful features The official correspondence of the Government of India has also continued to be placed under free contribution the various branches of the Secretariat have uniformly and graciously responded to applications for assistance by placing their files on Economic Products at the disposal of the Editor

GEORGE WATT,

*Editor Dictionary of the Economic
Products of India*

SIMLA,
July 1890

DICTIONARY

OF

THE ECONOMIC PRODUCTS OF INDIA

The Cocks Foot Grass

(C Watt)

DACTYLIS
glomerata.

DACRYDIUM, Soland Gen Pl III 433

A genus of coniferous trees, mostly natives of the Eastern Archipelago and the Malay Peninsula (Fig). New Zealand, Australia and Tasmania. They yield very beautiful woods and are highly ornamental. In account of which their cultivation is being largely prosecuted in most countries. Perhaps the species in greatest demand is **D. Franklinii** Hooker which yields the celebrated Huon Pine.

Dacrydium elatum, Wall Fl Br Ind V 048 CONIFERÆ

1

References — *K. & L. Forest Flora Burma* II 499; *Gambl. Man. Timb.* 304; *India Forests* III 178 q; *Vill.* 12; *Al. Ind.* XII 262; *Smith. En. Dict.* 217 353; *Tan. Agr. Hort. Soc. Ind.* V 110.

Habitat — Burma, probably Tenasserim. A tree 30 to 60 feet in height with dimorphous leaves. Very little is known regarding it and it is therefore alluded to here more or account of the high value placed on its congeners than of any special properties reputed to be possessed by the Indian representative.

DACTYLIS, Linn Gen Pl III 1193

Dactylis glomerata, Linn GRAMINÆ

2

COCKS FOOT GRASS

Syn — **D. HISPANICA** Roth **D. GLAUCESCENS** Willd.

References — *Roxb. Fl. Ind. Ed. C.B.C.* 114; *Vogel. Hort. Sut. Cal.* 717; *Thwaites Fl. Ceylon Pl.* 374; *Mueller. Select. Ex. T. p. Pl.* 101; *Murray Pl. and Drugs. Sind.* 14; *Koyle Ill. Him. Bot.* 28 417 423; *Treasury of Bot.* 379; *Morton Cyclop. Agr.* 600.

Habitat — A tall perennial grass said to be common on the Himalaya of the N.W. Provinces and the Panjáb. It receives its English name from the fancied resemblance of its flowering spikes to a fowl's foot.

Fodder — Highly valued in Europe as a fodder grass for cattle. It forms a portion of most good pastures especially on chalky or loamy soils. In *Morton's Cyclopædia of Agriculture* a full account of the grass is given. It is there said to be one of the most widely distributed and valuable of hay and pasture grasses being common in all countries of Europe south of the Arctic circle as well as in the north of Africa and in the corresponding latitudes of Asia and America. In Britain it forms a principal constituent of all the best natural pastures and meadows. The soil required is said to be of a deep rich and moist but not saturated.

FODDER.

3

D 3

**DÆDALACANTHUS
purpurascens****Indigo-producing plants****FODDER**

description — the finest developed native specimens are generally found in waste places by the sides of hedges and dykes on way side banks and in shady copses. It surpasses most of the native grasses in the enduring rapidity of its growth after being eaten or cut down as well as in the quantity and quality of its produce and as it is readily devoured by cattle, sheep and horses it became at an early period in the history of grass culture an object of agricultural care having been grown in England in 1764 and thence first from seed received under its American name of *Orchard grass* from Virginia where considerable progress had been made in its cultivation. Royle alludes to it as common on the North West Provinces and the Panjab Himalayas and in Atkinson's *Himalaya in Dist.* it is said to occur at Nuni Tal Kuthi Jilut and Jhuni on open situations at an altitude of 6000 to 8000 feet. By several writers it is spoken of as frequent on the Himalayas but no effort appears to have been made to cultivate the plant for fodder purposes. In the *Gazette* of Mysore and Coorg it is said to be cultivated in the Bangalore Gardens but practical experiments have still to be performed to ascertain the Indian regions where its cultivation is possible. Roxburgh alludes to two plants—*D. lagopoides* Linn. and *D. brevifolia* Linn.—as found on culturable soil near the sea. The former is referred to by Dalzell and Gibson (*Flora of India* p. 208) as common near the sea and is said to be the *Poa brevifolia* Kunth. Roxburgh placed these plants in *Dactylis* because of Burman having done so but was of opinion that they were more probably forms of *Poa*. At all events they are not species of *Dactylis*.

Dactyloctenium ægyptiacum, Willd. GRAMINEÆ see **Eleusine ægyptiaca Pers.**

D. scindicum, Buss. see **Eleusine scindica**

DÆDALACANTHUS, T. Anders Gen. Pl. II 1082

A genus of shrubs containing several highly ornamental plants some of which are extensively cultivated in Indian gardens. They are known to afford a valuable remedy used by the natives of the family to which they belong. It is probable that they are all like **D. roseus** used medicinally. The following may be generally enumerated.

[ACANTHACEÆ

4 Dædalacanthus nervosus, T. Anders Fl. Br. Ind. IV 418

Syn.—*JUSTICIA NIRVOSA* Vahl Bot. Mag. t. 1358 FRANTHEMUM NIRVOSUM Br. Ind. t. 47

Vern.—*Si* in NIAL Topatnyok LEPCHA Nalla nilambari rad m b. 111

References.—*Gamble Man. Timb.* 280 *Cat. Dal.* 59 *Walter Fl. Ind.* 126 167 *Bomb. Gas.* XV 440 *N. W. P. Gas.* IV p. 1333

Habitat.—A frequent plant at the base of the Himalayas (1000 to 3000 feet) from the Panjab to Bhutan. Cultivated in most tropical countries. Flowers bright blue.

Properties of this and the other species have been described for the sake of economy under the genus.

5 D purpurascens, T. Anders Fl. Br. Ind. IV 420

Syn.—*FRANTHEMUM PURPASCENS* in *Dal. & Gibs. Bomb. Fl.* p. 195

EUFRASIA Roxb. Fl. Ind. Ed. C. B. C. 37

Vern.—*Kalla jati* BENG. *Gulsham* HIND.

Habitat.—A fairly abundant plant in the forests of the central table land of India at altitudes of 1000 to 4000 feet in Central India. Bombay.

The Dæmia fibre

(G Watt)

DÆMIA
extensa.

Ghâts Belgaum Parasnath Assam &c Roxburgh describes it as a most stout flowering shrub' generally in its full beauty in February

Dædalacanthus roseus, T Anders Fl Br Ind IV 419

6

Syn—JUSTICIA ROSA Vahl ERANTHEMUM ROSEUM B**Vern.**—Dasmul MAR**References**—Dals & Gibs Bomb Fl 195 Dymock Mat Med W Ind 2nd Ed 587

Habitat—A shrub 2 to 6 feet in height flowers deep blue turning bright red as they fade Frequent in the Western and Southern Deccan from Bombay Ghats to Mangalore

Medicine—Dymock mentions the root boiled in milk is a popular remedy for leucorrhœa dose one drachm In the Southern Concan it is given to pregnant cattle to promote the growth of the fœtus

MEDICINE
Root

7

D splendens, T Anders Fl Br Ind IV 418

8

Reference—Gamble Man Timb p 280

Habitat—A handsome shrub with long spikes of pink flowers common in the undergrowth of Sal forests (Gamble)

DÆMIA, R Br Gen Pl II 764

[ASCLEPIADEÆ

Dæmia extensa, R Br Fl Br Ind IV 2) Wight Ic t 596;

9

Syn—ASCLEPIAS PCHINATA R b RAPHISTEMMA CILIATUM Hook f Bot Wlk t 5704 CYNANCHUM EXTENSUM Ait

Vern—Sag xuni ut an jut k HIND, Ch gulbanti BENG Uttarur
URIA K L l t ctu PB Lt na kha al SIND Uta ni
BOMB Uta ana MAR Nagala d thi CUY Ut an uta ni j t uk
Jutuk DIC Uta ni elpparutti ttdn ni IAM Tittupdku
A rith ch tti du ttupu IRI Hl ko at ge KAN Velip pariti
MALAY I g ph la (according t Ainslie) JANS

References—R b F Int Fd (B C 45' Thwaites En Ceylon Pl
1st Dals & Gibs Bomb Fl 150 Stewart Pb Pl 145 Ait hison
Cat Pb 1st 5th 11 7 5 Gah Cat Bomb Pl 122 St Waller
Ellis t F a Ad 48 6 Wight Co trib 59 Lin Soc
Jour AN 177 Pl a n nd 142 Ainslie Mat Ind II 454
Mo dees She ff Sipp th r n Jil 129 Dymck Mat Med W id
2nd Ed p 53 S A n n Bomb Drugs 85 Mu ay 11 and Drugs
63 d 1/1 Ho c Dept C R ga lina lla n Ind 239 Brite Cat
Paris E hib Du y U Fl 175 Li ho a l Il Bomb 233 274 Bird
wood Bomb P 317 Royle Il Him Bot 272 Isola l lape maki g
Mat 5 15 20 Hite Gaz O is a Il 181 Gaz Mysore and Co g
I 56 Gaz N W t I 82 X 313 Ju y Rep Mad as Exh b
Spons I cyclop 947 B fow Cyclop I 475

Habitat—A common fœtidly scented climber met with throughout the hotter parts of India ascending to 3000 feet but does not apparently occur in Burma or the Malay Peninsula Distributed to Afghanistan

Fibre—The STEMS yield a fibre which has been recommended as a substitute for flax It is said to be very fine and strong a sample shown at the Madras Exhibition 1855 gained a medal Birdwood in his Bombay Products remarks that it is the commonest weed in the Deccan where it is called *Ootrun* and that the late Colonel Meadows Taylor was the first to draw attention to its valuable fibre Although this fibre is frequently mentioned by Indian writers it does not appear to have been thoroughly examined In Spons Encyclopædia the statements first published in the Madras Jury Reports are reproduced But neither Roxburgh nor Royle appear to have examined the fibre Balfour says it is

FIBRE
Stems.
10

DAHI

Curd or Coagulated Milk

FIBRE

a promising substitute for flax In a recent report furnished by the Conservator of Forests Northern Circle Madras it is stated that 'the plant is common in the drier districts of the Presidency It affords a very pretty fibre which is said to be sometimes used for fishing lines

The fibre was not shown at the Colonial and Indian Exhibition but as the plant is extremely plentiful there should be no difficulty in procuring a large annual supply

MEDICINE

Plant

II

Leaves

12

Juice

13

Medicine—The PLANT has emetic and expectorant virtues and is extensively employed by natives in the diseases of children Ainslie says that a decoction of the LEAVES is given to children as an anthelmintic in doses not exceeding three table spoonfuls the JUICE of the leaves is ordered in asthma The *Pharmacopœia* assigns the above properties to it as current native opinion but adds that although reputed to be a cure for snake bite this rests on insufficient grounds Dr Oswald held that it was a fairly good expectorant in the treatment of catarrhal affections in ten grain doses for which purpose it was used at the Pettah Hospital Mysore Dr Dymock says that in Western India the plant has a general reputation as an expectorant and emetic In Goa the juice of the leaves is applied to rheumatic swellings Drury adds the further fact that the juice of the leaves mixed with *chunam* is applied externally in rheumatic swellings of the limbs

SPECIAL OPINIONS—§ Used in infantile diarrhœa (*Surgeon Major D R Thomson M D C I E 1st District Madras*) The fresh leaves made into a pulp are used as a stimulating poultice in carbuncle with good effect (*Asst Surgeon Sakhambari Arjun Ravat L M Bombay*)

Certainly valuable as an emetic with infants the leaves are washed and the juice expressed by rubbing between the palms of the hands the leaves of the dark *Toolsi* are similarly treated and then a mixture of the juices is given this preparation is a stimulating emetic (*Civil Surgeon B Evers M D Werdha*)

Fodder—The PLANT is said to be browsed by goats

FODDER

Plant

14

Dæmonorhops (Calamus) Draco—The Dragon's Blood Palm see Vol II, C No 68

15

Dahi (DADHI Sans)

A term given to a kind of curd or rather coagulated milk To prepare this the milk is first boiled then soured by being thrown into an unwashed vessel in which *dahi* had been previously kept At times however an acid is employed to precipitate the solid ingredients of the milk and rennet is used by a certain limited community only *Dahi* thus differs from curd as prepared in Europe in being practically sour boiled milk The milk is boiled almost immediately after being obtained from the cow and thus contains all its fat or butter *Dahi* in the liquid state is largely consumed so that the whey not being separated *Dahi* contains in solution all the sugar of milk The curd or casein even if separated from the whey contains however too much fat to be made into cheese It is in fact cream cheese and on drying crumbles to a powder The whey is separated by pressing the curd inside a cloth and in this condition it is largely used in cookery and is the basis of all the sweetmeats made in India The natives of India have thus come to learn that to eat the liquid *dahi* they are consuming a wholesome mixture of the muscle forming materials casein and fat with the heat giving ingredient—sugar—the equivalent of starch But to eat the curd alone to any large extent would be injurious by causing severe constipation After being made into sweetmeats it is however rendered highly nutritious through having restored to it sugar

Indian Rosewood	(G Watt)	DALBERGIA cultrata.
and by being mixed with flour of wheat or of rice is made into an article of diet. Hence it follows that the sweetmeats so largely consumed as a midday meal in India partake of all the ingredients of food and are not mere luxuries like the sweets of Europe.		DAHL
The trade in expressed <i>dahi</i> is very extensive and within a radius around the larger cities immense quantities are carried by train—the plastic substance being contained within a cloth and resting in open baskets. The manufacture of cheese is practically unknown in India except as cream cheese and it seems probable that by the working classes a cheap cheese to be eaten along with bread would be appreciated. But there exists the practical difficulty which in all probability suggested the present course namely that the climate of India would sour the milk before the cream could have time to rise to the surface hence in all probability the practice of rapidly boiling milk which is all but universal in this country.		
See Milk and Rennet		
Dakh , a term applied in Hindustani to grapes but also to raisins currants or the fruit of <i>Sageretia oppositifolia</i> —the <i>gidardák</i> or Jackal's vine.	16	
Dakra , a substance said to be used in Nepál to poison elephants. It is made up in balls along with rice. <i>Dakra dhakka</i> &c are names given to <i>Eleodendron Roxburghii</i> the bark of which is a virulent poison and <i>Cissampelos Pareira</i> is said to be the <i>Dakh nyabisi</i> or antidote to <i>Dakh</i> . The exact nature of the Nepál poison does not appear to have been made known but it more than likely contains Aconite.	17	
Dal , a generic name for split peas but more especially applied to the split peas of <i>Cajanus indicus</i> the <i>Arhar ka dal</i> . <i>Phaseolus Mungo</i> and <i>P. radiatus</i> are the <i>Mung ka dal</i> while <i>Cicer arctinum</i> (gram) is the <i>Chunna ka dal</i> and <i>Lens esculenta</i> the <i>Masur ka-dal</i> .	18	
DALBERGIA , Linn <i>Cen Pl I 544</i>		
A genus of valuable trees comprising some 60 or 70 species cosmopolitan in the tropics. The generic name was given in honour of Dalberg a Swedish botanist. The genus DREPANOCARPUS differs only in having versatile anthers and in the fruit being lunate to reniform. Into that genus Kurz placed the following Indian species <i>D. Cumingii</i> , <i>D. reniformis</i> , <i>D. spinosa</i> , and <i>D. monosperma</i> . These are the species which in the <i>Flora of British India</i> constitute the sub genus SELENOLOBIUM except that <i>D. Cumingii</i> does not appear to be described in the <i>Flora</i> . Bentham and Hooker in the <i>Genera Plantarum</i> regard DREPANOCARPUS as an American genus with one species African but none indigenous to India. India however possesses including the DREPANOCARPUS of Kurz some 20 species of DALBERGIA of which the following are the more important and although in some cases not specially dealt with in this work all are of considerable economic interest.		
Dalbergia cana , Grah <i>Fl Br Ind II, 237</i> LEGUMINOSÆ	19	
Habitat .—A tree 40 to 60 feet high (according to Kurz) a scandent plant (according to the <i>Flora of British India</i>) frequent in the tropical forests of the eastern slopes of the Pegu Yomah and still more frequent from Martaban down to Tenasserim (Kurz).		
Structure of the Wood .—White turning brownish rather heavy of a very coarse fibre soon attacked by xylophages (Kurz <i>For Fl Burm I 344</i>).		TIMBER. 20
D. cultrata , Grah <i>Fl Br Ind II 233</i>	21	
Vern.—Yendike yindak veng dak BURM		

DALBERGIA lanceolaria**The Blackwood**

- References** — *Kurz For Fl Burm I*, 342 *Gamble Man Timb* 128; *Indian Forester I* 120 *VI* 125 *VIII* 416 *Balfour Cyclop I* 878
- Habitat** — A moderate-sized tree of Burma (Prome) in general habit resembling *D lanceolaria* especially in the character of the pod **Kurz** says it is common in all leaf shedding forests especially in the upper mixed savannahs and *Eng* forests all over Burma from Ava to Martaban and down to upper Tenasserim
- Resin** — Exudes a red resin according to **Kurz** **Mr M H Ferrars** says that the Karenis use the plant for the propagation of lac
- Oil** — **Balfour** states that this tree furnishes a useful oil
- Structure of the Wood** — Purplish black with darker streaks harder than but in structure similar to that of *D latifolia* Weight 8½ a cubic foot The sapwood is pale coloured turning pale brown very perishable the heartwood blackish and ebony like often streaked red on a paler ground extremely durable
- It is employed for wheels agricultural implements handles of *dahs* and spears but especially for carving
- Dalbergia (Drepanocarpus) Cumingii, Bth** as in *Kurz For Fl* [*Burm I* 336]
- Habitat** — A tree like scandent shrub met with in Tenasserim
- Dye** — **Kurz** says this is a dye wood and furnishes the *Kayu lakka* of commerce The writer can discover no other reference to this plant than that given by **Kurz** It is not described apparently in the *Flora of British India* **Gamble** (*Man Timb* 124) simply repeats **Kurz's** words
- D foliacea, Wall Fl Br Ind II** 232
- Vern** — *Tatebiri* NEPAL
- References** — *Kurz For Fl Burm I* 347 *Gamble Man Timb* 129
- Habitat** — A large straggling shrub met with in the Eastern Himalaya and Burma (according to **Gamble**) the *Flora of British India* mentions only Ava Iegu and Martaban
- Structure of the Wood** — White porous with a small dark heartwood structure resembling that of *D stipulacea* except that the medullary rays are broader (*Gamble*)
- D glomeriflora, Kurz Fl Br Ind II** 236
- Habitat** — A tree 30 to 40 feet in height found occasionally in the upper mixed forests of the Prome Yomah at 1 000 to 2 000 feet elevation It flowers in March and April (*Kurz For Fl Burm I* 345)
- D hircina, Benlh Fl Br Ind II** 236
- Vern** — *Saras bandir tantia gogera* N W P *Bakalpattia tantia* KUMAON
- References** — *B andis For Fl* 151 *Gamble Man Timb* 124 *Indian Forester XI* 3 *Atkinson Him Dist* 309
- Habitat** — A small tree of the Central and Eastern Himalaya from Garhwál and Kumáon to Bhután ascending from the foot of the hills to altitudes of 5 000 feet Flowering season April to May the seeds ripening in July
- D lanceolaria, Linn Fl Br Ind II** 235
- Syn** — *D FRONDOSA Roxb D ZEYLANICA Roxb D ARBOREA Heyne D ROBUSTA Wall D HIRCINA Wall*
- Vern** — *Takoli bithua* HIND *Chakemdia* (in Puri) BENG *Piri KOL Chapot* 111 *SANTAI Bander siris* NEPAL *Takoli bithua* N W P

The Blackwood or Rosewood

(G Watt)

DALBERGIA
latifolia.

Péssi RAJ MERWARA Dandous SIND Takohi kar ani gengri
BOMB Haryani DHARWAR Dándashi THANA Dandous haurchi
dandusa MAR; Barbat parbati BANSWARA Gengri PANGH MEHALS
Nal valanga, TAM Erra pa hichari pedda sópara ye ra patia u
pasarganni TEL Vel urruwai (TAM in Ceylon) be-lulabba (Roxb)
SING

References—Roxb *Fl Ind Ed CBC* 534 Brandis *For Fl* 151
Beddome *Fl Sylv* 88 Gamble *Man Timb* 126 Thwaites *En*
Ceylon *Pl* 93 Dals & Gibs *Bomb Fl* 78; W Elliot *Fl Andh* 53
150 Wight & Arnott *Prod* 266 Trimen *Cat Ceylon Fl* 27 Campbell
Econ *Pr d Chutia Nagpur No* 8442 Duthie *Report of a Tour in*
Merwara Atkinson Him Dist 309 Drury *L Pl* 175 Li boa
U Pl Bo b 61 *Bomb Gaz (Thana Dist)* XIII 24 (Kanara
Dist) XV 433 *Gaz N W P (Bundelkhand)* I 80 Balfour *Cv*
clap I 878 *Ajmere Merwara Special Report by Assist Conservator*
Forests

Habitat—A deciduous tree of the sub-Himálayan tract from the
Jumna eastwards ascending to 2500 feet also met with in Central and
South India and Bombay Kurz does not mention it as met with in
Burma but the Conservator of Forests in Bengal reports that though
scarce this small tree occurs in the Puri District

Oil—The OIL expressed from the SEED is said to be used in rheumatic
affections The MILK which exudes from the ROOT is occasionally ap-
plied to ulcers (*Drury*)

Medicine—Drury says that the BARK in infusion is given internally
in dyspepsia and the LEAVES are rubbed over the body in cases of leprosy
and other cutaneous diseases That information he remarks is derived
from Roxburgh but the writer cannot find the passage referred to in Rox-
burgh's works and suspects that Drury was in reality compiling from
Ainslie's *Dalbergia arborea Willd* which is *Pongamia glabra* the seeds
of which yield a well known oil useful in skin affections Beddome how-
ever states that the BARK and an OIL obtained from the SEEDS are in use
medicinally with the natives The Revd A Campbell writes that the
Santals use the bark along with that of *Flacourtia Ramontchi* as an ex-
ternal application during intermittent fever The leaves and the ROOT
he adds are also employed medicinally

Structure of the Wood—White moderately hard not durable no
heartwood Weight 62lb per cubic foot Beddome says the timber is
useful for building purposes In the *Bombay Gasetteer* (Konkan) it is
stated that the wood is used for the handles of tools and small agricultural
implements Roxburgh observes that it is a quick growing large beauti-
ful tree the timber of which is useful for many purposes Similarly
Balfour reports that it affords a strong and useful timber

Dalbergia latifolia, Roxb Fl Br Ind II, 231

THE BLACKWOOD OR ROSEWOOD OF SOUTHERN INDIA

Syn—*D EMARGINATA Roxb*

Var aussoides is said by the *Flora of British India* to occur on the
Nilgiri hills It differs from the normal condition in having the leaflets
rather narrower in proportion to their length and somewhat obtusely
pointed It is the *D aussoides, Grah* and the *D javanica Miq* Bed-
dome writes however that this form is common in the forest about
Coimbatore and at Palghát on the Anamallays at Madura and Tin-
nevely He adds the wood is generally of a redder colour and the
tree flowers in the rainy season (July) instead of in the hot weather; it is
always distinguished by the Palghát axemen as the *acruputu* while *D*
latifolia is called *ectee* (*Dr Wight* apparently transposes these native

OIL
Seed.

33

Root

34

MEDICINE

Bark

35

Leaves

30

Seeds.

37

Root.

38

TIMBER

39

40

41

DALBERGIA
latifolia.**The Blackwood or Rosewood**

names) I cannot however distinguish the two trees botanically the flowers of *sissoides* are said to be rather larger and the leaves narrower but these differences are not constant and the same drawing might answer for either tree I cannot therefore look upon *sissoides* as more than a variety of *latifolia*. Balfour remarks of this form that the wood contains much oil which unfits it for receiving paint and he adds logs are almost always faulty in the centre

Vern—*Shisham* HIND *Sitsal* (sweta sāl i e white sāl) BENG *Ruti kiri* siso KOL *batsaiyar* SANTAL *Sissua sissa* URIYA *Russerap* MICHI *Seris* GOND *Sirās sissu sirsa* MANDLA *Sitsal* OUDH *Serisso* KURKU *Shisham* PB *Bhotuk* BHIL, *Shisham* MERWARA RAJ *Tali* SIND; *Shisham* siras C P *Shissam sissu*, *kalarukh tivus* shisar BOMB *Siswa shisham sissu sissa* *kalarukh bhotheula sissu* MAR *Sissu* GUZ *Shisao* KON *Iti eriwadi totakatti jittagē yerugudu* TAM *Irugudu iruvudu irugadu jitegi yerugudu jitangi jitegi* TEL *Biti thodagatti* KAN

Sir Walter Elliot points out that the *Simsupa* of Wilson is incorrectly applied to this tree and should be assigned to the *Sal* proper (*Shorea robusta*). *Patsa* and *yerugudu* exactly correspond with the English Black wood The Black wood which Dr Hove describes in his Tour in Bombay (in 1787) was most probably *Diospyros montana* and not *Dalbergia latifolia*

References—*Roxb Fl Ind Ed C B C* 532 533 *Brandis For Fl* 148 *Kurz For Fl Burm* 342 *Bedlome Fl Sylv XXIV* *Gamble Man Libb* 127 *Dale & Gibs Bom Fl* 77, *Wight Icon t* 1156 *E o i P d Chutia Nagpur* by Rev A Campbell No 9454 *Duthie Report of a Tour i Me uara W Elliot Fl Andh* 71 75 128 176 & 192 *Mason Burma and Its People* pp 530 769 *Cleghorn* 164 *Lisboa U Pl Bomb* 60 27 *Birdw od Bomb Pr* 328 *Royle Ill Him Bot* 195 *Liotaud Dyes* 33 *Indian Fr* I 84 99 II 18 19 412 111 45 201 IV 202 366 411 V 497 VI 304 VIII 102 105 125 387 414 IX 356 X 222 309 549 552 XII 188 (XII) 313 app 12 XIII 120 XIV 159 199 421 *Balfour Cyclop* I 679 *Smith Dic* 53 357 *Treasury of Bot* 380 *Kew Off Guide to Bot Gardens and Arbore tum* 45, *Sind Gas* 193 *Bomb Gas (Ahmedabad)* IV 23 *Bomb Gas (Nasik)* XVI 18 *Bomb Gas (Ahmednagar)* XVII pp 18 26 *Bomb Gas (Poona)* XVIII p 52 *Bomb Gas* XV 33 67 *Report by Shuttleworth Conservator Forests Bombay Settlement Report Seone 10 of Chandwara* 110 of *Nimar* 306 of *Chand* app VI of *Upper Goda very* 37 of *Bhanda* 18 *Bartool* 125 *Rajpore* 75 *Manual of Trinopoly* by Moore 77 *Mysore and Coorg Gas* I 48 52 60 111 20 *Man Coimbatore* by Nicholson pp 401 484 *Man Ci ddapah* by Gribble 56 71 262 *Fore t Admin Rep* *Chutia Nagpur* 1885 pp 6 30 *Settl Rep* *Lahore* 15 &c &c

Habitat—A deciduous tree attaining a large size in South India also found in Oudh Eastern Bengal and Central India The *Flora of British India* states that it is common through the Western Peninsula, Sikkim, and Bihar *Hooker fil Bundelcund Eigeworth* Mr A T Shuttleworth writes of Bombay The tree grows extensively and vigorously in the Deccan Konkan and Guzerat forests but does not attain to any large size Mr McGregor Conservator of Forests Southern Circle gives it as common in Kanara Belgaum and Dhárwar in the moist regions, not as stated by Brandis in the dry forests

Best reported to the Bombay Government that the tree was difficult to rear owing to the ravages of insects on the sprouting seeds It may however be successfully grown during heavy rains The seed may be sown in drills well supplied with the refuse of lamp oil mills It may also be grown from suckers but the wood does not turn out so well as when reared from seed (*Conf* with Drury) Beddome remarks It is found throughout the Madras Presidency Mysore Coorg Bombay Central

The Blackwood or Rosewood

(G Watt)

DALBERGIA
latifolia.

India and parts of Bengal Sikkim and the Andaman Islands' ' It is not found in Ceylon, nor I believe in Burma It ascends the mountains to nearly 4 000 feet and grows equally well in the dry deciduous forests with teak and in the moist evergreen sholas and it is often associated with bamboo It flowers in March and April It may be raised from seed but is a very slow grower Colonel J G Macrae reports that in Sind this plant has been experimentally cultivated but with indifferent results The Conservator of Forests Bengal reports that it has been introduced into the Sitapahar reserve Chittagong Division and promises to succeed it is nowhere indigenous in the Hill Tracts and Collectorate of Chittagong The Conservator of Forests North Circle Madras reports that it is found throughout the Presidency and varies greatly in size according to the moisture of the locality In Malabar the West Nilgiri slopes South Canara and Travancore it grows to a large size and furnishes splendid pieces of timber fit for export In Ganjam Godavery and the Eastern Ghát forests generally it grows fairly big and gives a rather harder darker wood of finer quality while in the hills of Cuddapah North Arcot Bellary and the Western Carnatic it is smaller and gives only pieces for small furniture and carved house posts It is also said to be common in the deciduous forests of Coorg the wood selling in the forests for 5 to 6 annas a cubic foot

Gum—The tree is said to yield a GUM (E A Fraser Assistant Agent to Governor General Rajputana)

Oil—The SEEDS yield OIL of which almost nothing further than this fact is at present known indeed the same doubt has been expressed regarding the oil of *Dalbergia lanceolata* may be viewed as applicable to the statements made by some writers regarding the oil of *D latifolia*. Bed dome makes no mention of the oil or of any medicinal properties as assigned to this specie

Fodder—Mr Shuttleworth (Conservator of Forests Bombay) reports that the LEAVES are used as FODDER Mr Lisboa (quoting from Brandis) remarks that this is the case in Oudh but he makes no mention of the practice being followed in Bombay

Structure of the Wood—Sapwood yellow small heartwood extremely hard dark purple with black longitudinal streaks no distinct annual rings but alternating concentric belts of dark and light colour which however run irregularly into each other Weight from 50 to 66lb a cubic foot growth moderate 5 to 9 rings an inch It coppices well is easily raised from seed and reproduces naturally and easily

It is a valuable furniture wood and is exported to Europe from the forests of Kanara and Malabar Wood sent to London for sale in 1878 fetched £13 10s per ton It is also employed for cart wheels agricultural implements gun-carrages &c It is good for carving and fancy work and is used for the handles of knives kukris and other arms It has been employed for sleepers Nine sleepers which had been down seven to eight years on the Mysore State Railway were found to be when taken up—five good three still serviceable and one bad It has been grown in plantations in Malabar and Kanara (Gamble & Brandis) In the *Bombay Gazetteer* it is stated the timber is one of the most valuable in India is strong very hard close grained and of a purple black It takes a beautiful polish and is reckoned the best furniture wood A seasoned cubic foot weighs 30lb In the *Lahore Gazetteer* it is stated that a fair sized tree will fetch from R40 to R70 Kurz says the heart wood is greenish or greyish black and often mottled or lighter veined Used extensively in India for cabinet work knees of vessels agricultural implements combs &c In Trichinopoly vases and other ornamental articles are made of the wood It is

GUM
42
OIL
Seeds.
43

FODDER
Leaves
44

TIMBER.
45

Furniture
Combs.
46
Vases.
47

DALBERGIA
ovata**The Dalbergias****TIMBER**

sometimes called Indian rose wood from the resemblance when polished to the timber of that name. The planks of black wood have one great defect—a tendency to split longitudinally when not well seasoned. **Beddome** remarks of the wood it differs much in colour but is generally purple-black it admits of a very fine polish and is our best furniture wood and is extensively used for gun carriage purposes. It generally fetches a higher price than teak. **Roxburgh** says Bengal grown timber is not so heavy as that obtained on the coast of Coromandel and Malabar though fully as beautiful. **Wight** states that the Madras plant more closely corresponds with **Roxburgh's D emarginata** than **D latifolia** but the wood of the former is not black which I think fatal to their identity. It is possible however that the Malabar tree may be specifically distinct from the Bengal one. **Wight** also states that planks often 4 feet in diameter are obtained from Malabar and that too after all the white external wood has been removed. **Roxburgh** alludes to a tree 20 feet in circumference.

Dalbergia Mooniana, *Thwaites* see **Pericopsis Mooniana** *Thwaites*
Fl Br Ind II 252

48 **D (Drepanocarpus, Kurz) monosperma**, *Dolz* *Fl Br Ind*
[*II 257*]

Syn—**D PANICULATA** *Wall* **D TORTA** *Grah*

Habitat—Shores of the Western Peninsula Ceylon and the Malayan Peninsula (*Fl Br Ind*). Tidal jungles of Upper Tenasserim (*Kurz*). A scandent bush with hooked branches (Conf with *Gamble Man Timb 124* *Dolz & Gies Bomb Fl 78*).

49 **D nigrescens**, *Kurz* *For Fl I 346*

Vern—*Thitsanweng* or *thitsamwin* **Burm**

References—*Kurz For Fl Burm 346* *Gamble Man Timb 129*

Habitat—A moderate sized deciduous tree of the dry mixed forests of Upper Burma. Leaves small blunt or retuse panicles dense or compact pedicle short. The name is given on account of the leaves turning black on being dried.

Structure of the Wood—Light grey soft weight 39lb a cubic foot.

There is some doubt about the identification of these species owing to the absence of concentric bands (*Camble*). It is not referred to in the *Flora of British India*.

D ougeinensis, *Roxb* see **Ougeinia dalbergioides** *Benth* *Fl Br*
[*Ind II 161*]

51 **D ovata**, *Grah* *Fl Br Ind II 231*

Syn—**D GLAUCA** *Wall*

Vern—*Madama* (**Kurz**) *douk ta louk* (**Mason**) **Burm**

References—*Kurz For Fl Burm 343* *Mason's Burma 530 769*

52 **Var obtusifolia**.—A form with leaflets 3.5 inches long oblong obtuse emarginate found in Burma.

Kurz regarded **D ovata** *Grah* as distinct from **D glauca**, *Wall* thus restoring two species which in the *Flora of British India* were reduced to one. Of **ovata** he says the leaflets are acuminate and to **glauca** he assigns the characters given above to the variety **obtusifolia**. The writer prefers following the *Flora of British India* in all matters of synonymy since he has no means of examining the plants and of thus forming a personal opinion.

D 52

TIMBER
50

A *Dalbergia* with white soft wood

(G Watt)

DALBERGIA
paniculata.**Dalbergia paniculata, Roxb Fl Br Ind II 236**

53

Vern—*Dhobin* *dhobin* p ssi *safpuria* HIND Pondri KOL Su eli
passi BAIGAS *Padri* GOND BHIL *Dubein* BANDA *Katir* a N W
 P OUDH *Phassi* KURKU *Dobeti* *dhobin* *passi* C P *Padri* DHAR
 WAR *Pondarra* *sheodur* *topia* *passi* or *pha* MAR *Passi* MEIGHAT
 BERAR *Pachalai* *valange* TAM *Potrum* *pachchári* *porilla* *sopara*
patsuru *porilla* *sopara* *tella* *patsaru* *tober* TEL Hasur *guniri*
pachari *padri* KAN *Piangani* MALAY *Tapukben* BURM

References—Roxb *Fl Ind Ed C B C* 534, *Brandis For Fl* 150
Kurz For Fl Burm I 345 *Beddome Fl Sylv* 85 *Gamble Min*
Timb 129 *Dals & Gibs B mb Fl* 78 *Sir W Fillet Fl Andh*
140 155 178 Dymock Mat Med W Ind 2nd Ed 689 *Lisboa U*
Pl Bomb 61 *Birdwood Bomb Pr* 328 *Balfour Cyclop I* 679
For Adm Rep Ch Nagpur 1883 30 *Bomb Gas III* 200 *XI* 26
XV 67 *Gas Mysore 2nd Corg I* 48 *Gas N W P (Buniel*
khanda) I 80 *Indian Forester II* 16 *IV* 321 *IX* 357 *XIII*
I O XIV 421 *Settlt Rep of Chanda App II*

Habitat—A large deciduous tree according to Gamble met with in the North West Himalaya from the Jumna to Oudh Central and South India (quoted by Kurz as met with in Burma but identification doubtful) Balfour states that it grows at Moulmein By the *Flora of British India* its habitat is given as the plains of the Western Peninsula Brandis states that it occurs in South and Central India Gonda forests of Oudh Siwalik tract west of the Jumna ascending to 2500 feet He adds the leaves are shed in February March the new foliage comes out in April and May with the flowers Beddome remarks This tree is common in the plains and subalpine dry forests throughout the Madras Presidency Mr McGregor Conservator of Forests Southern Circle Bombay reports that it is common in Dharwar Belgaum and Kanara Mr G Greig Conservator of Forests N W Provinces alludes to the tree as met with in the Banda forests Colonel G J van Someren refers to this tree as met with in the Melghat forests of Berar The Editor of the *Indian Forester* (XIV 421) says *D paniculata* is a moderate sized tree attaining a girth of 5 to 6 feet and a height of 60 to 80 feet is widely distributed throughout South and Central India and is also found in the Sub Himalayan tracts to the east of the Sarda river Unlike its allies *D Sissoo* and *D latifolia*, which form dense highly coloured useful heartwoods the whole wood is whitish grey and soft and abnormal in possessing narrow soft layers of parenchyma alternating with broad concentric masses of wood so that planks cut out of old trees often fall to pieces

Gum—The tree is reported to yield a GUM

Structure of the Wood—Yellowish or greyish white soft perishable no heartwood Structure most remarkable entirely different from that of the other species of the genus broad concentric masses of wood alternate with narrow dark coloured belts of a fibrous substance resembling the inner bark Wood not durable and very subject to the attacks of insects Weight according to Skinner 48lb Gamble 37lb Beddome 60lb unseasoned and 48lb seasoned per cubic foot Specific gravity 768 Roxburgh says the wood is white and firm to appearance but less useful than some of the other species Beddome remarks that it is used for building and other purposes It affords useful fire-wood Kurz affirms that it is good for common household purposes

In the *Indian Forester* (XIV 421) an interesting note is given by the Editor on a sample of coppice shoot furnished by Mr S O Moss Sub-Assistant Conservator Tinnevely which shows a coppice shoot springing from the zones of soft tissue between two of the concentric layers

GUM.
54
TIMBER.
55

DALBERGIA
rubiginosa

A *Dalbergia* said to be good for burning lime-stone.

TIMBER

of the wood in one specimen the shoots are from close to the centre of the stem. The stumps were 12 inches in radius and the concentric rings vary from half an inch to a whole inch in thickness. In the case of shoots springing from near the centre of the stem the latter appears to have been decomposed at the centre and the shoot which may have originated in a layer of soft tissue has passed radially across three zones of harder and two of softer tissue. This discovery of Mr Moss appears to be a new one in vegetable physiology as adventitious shoots generally spring from the cambium zone or directly between the wood and bark.

MESTIC

56

Domestic Uses—Icaves and twigs are used to manure fields in Madras (Ind For IX 357)

57

***Dalbergia purpurea*, Wall Fl Br Ind II 235**

A scendent species allied to *D. lanceolaria*

Vern—*Thapöt* BURM

Habitat—Martaban and Pegu common in the mixed forests down to Upper Tenasserim

IMBER

58

Structure of the Wood—Sap wood light not much used heart wood black and ebony like (*Kurs For Fl Burm I 344*)

59

***D. reniformis*, Roxb Fl Br Ind II 238 Wight Ic t 261**

Syn—*D. flexuosa* Grah *D. stipulata* Wall *Drepanocarpus reniformis* *Kurs For Fl Burm I 336* (see the note above under the genus *DALBERGIA*)

Vern—*Tankna* (Kurz) and *Doukloung* (Mason) BURM *Kures Sylhet* (Roxburgh)

References—*Roxb Fl Ind Fd C B C 534 Mason's Burma and Its People pp 530 and 769*

Habitat—A large crooked bushy tree common in the swampy forests of Pegu and Martaban down to Upper Tenasserim flowering in February and March and the fruit ripening in April and June (*Kurs*). The *Flora of British India* adds that it is found in Silet. Roxburgh says that in Sylhet it flowers in March and the seeds ripen in December.

Structure of the Wood—White turning yellow coarsely fibrous light, very perishable.

Domestic Uses—Roxburgh states that the wood yields a greenish flame and is reckoned the best for burning limestone.

IMBER

60

MESTIC

61

62

***D. rimosa*, Roxb Fl Br Ind II 232 Wight Ic t 262**

Vern—*Kaogram* SYLHET

Habitat—A shrubby species met with in the tropical zone of the Eastern Himalayas ascending to 4000 feet—Khasia hills Sylhet Assam Brandis (on the authority of Stewart) says that it is also met with in the Siwalik tract and outer Himalayas west of the Jumna. Reported to be cultivated in Bangalore (*Mysore Gas*). (Conf with *Gamble Man Timb 124 Brandis For Fl N Ind 148 Roxb Fl Ind Ed C B C 536*)

***D. robusta*, Roxb see *Derris robusta*, Benth Fl Br Ind, II 241**

63

***D. rubiginosa*, Roxb Fl Br Ind II 232**

Vern—*Karra sirli tella tige* TEL Sir Walter Elliot remarks that Roxburgh's name *tella tige* simply means white climber.

Habitat—A scendent species to be distinguished from *D. monosperma* by the character of the stamens and ovary according to the *Flora of British India* it is met with in the Western Peninsula. Roxburgh's locality

D 63

for it was the Circar mountains It is described by Mr Talbot as occurring in Kanara

Dalbergia scandens, Roxb see *Derris scandens* Sir Walter Elliot remarks that this is the *Chiratala bôdi* and the *surlî* in Telegu *Rheede VI 22*

D Sissoo, Roxb *Fl Br Ind, II 231*

64

THE SISSOO

Vern—*Shisham* *sisso* *sisai* *sasam* *sisu* HIND *Shisu* (*Sisu* by U O Dutt) BENG *Sissu* ASSAM *Sisu* URIYA *Sissai* OUDH *Sisu* N W P *Tali* or *tahli* *safeda shin nelkar shisham shishai shia shewa* PB *Shewa* (Gamble Stewart) *Zagar* (Lace) PUSHTU *Shawa* or *shewa* (PUSHTU) in Bannu and Peshawar Districts *Shi ham* (MERWARA) RAJ *Sissu tali* SIND *Sissu* BOMB *Tanach sisam* GUZ *Yette nukku kattai* TAM *Sissu karra* or *sisso karra* (*sisso* by Elliot) TEL *Biridi cishmabage* KAN *Sinsapa* (U O Dutt) *shingshupa* (Roxburgh) SANS *Sisam* *sasim* ARAB

Dr Moodeen Sheriff explains that in Dukhni the word *Shisham* is used for any wood which is black or reddish black and heavy whatever tree may produce it *Sishu kat* is the Bengali name for the above wood not *Shishu* by itself which means a young boy It may be added that according to some writers the word is *sisso* by others it is *sisso*

References—*Roxb Fl Ind Fd C B C 533 Brandis For Fl 140 Beddome Fl Sylv t 25 Gamble Man Timb 124 Dals & Gibs Bomb Fl Suppl 25 Stewart Pb Pl 65 Atchison Cat Pb and Sind Pl 50 Sir W Elliot Fl Andh 168 Dr Stock Report on Sind Moodeen Sheriff Supp Pha m Ind 129 U C Dutt Mat Med Hind 318 Murray Pl and Drugs Sind 129 Firminger Man Gar 448 Baden Powell Pb Pr 342 577 Atkinson Him Dist 734 Drury U Pl 177 Lisboa U Pl Bomb 60 217 Royle Ill Him Bot 8 191 195 Spons Encyclop 2021 Balfour Cyclop 879 Smith Dic 379 Treasury of Bot 381 Kew Off Guide to the Mus of Ec Bot 45 Kew Off Guide to Bot Gardens and Arboretum 76 Jour Agri Hort Soc 1885 Vol VII pt III New Series Procs Soc ci 1875 78 Vol V 72 Report Colonial and Ind Exhibn Ind Timbers p 3 Indian Forester III 45 IV 321 366 386 411 V 180 IX 75 92 490 X 60 402 XII app 1 27 XIII 55 339 XIV 159 199 421 Bombay Gazetteers V 286, VI 12 VII 32 35 Punjab Settl Rep (Fhang) 20 (Simla) XLIII (Dera Ghazi Khan) 4, (Hasara) 10 (Kangru) 21 (Peshawar) 13 (Guzerat) 133 Punjab Gazetteers (Ludhiana) 10 (Amritsar) 4, (Karnal) 16 (Rawalpindi) 15 (Fhang) 15 (Sialkot) 11 (Jalandhar) 4 (Shahpur) 69 (Musaffargarh) 21 (Hasara) 13 (Bannu) 23 (Dehra Ismail Khan) 19 (Rhotak) 14 N W Province Settl Reports (Shajehanpur) IX N W P Gazetteers (Meerut) 33 248 (Bundelkhand) 80 (Agra) LXXI Madras Manuals—Trichinopoly 77 Central Prov Settl Report (Chanda) 108 Mysore Gaz I 48 60 Gasetteer of Orissa II 5 179 Sind Gasetteer 695 Special Report by Col J G Macrae Conserv Forests Special Report by Conserv Forests Assam Assist Conserv Forests Merwara and Assist Conserv Forests Quetta Trans Agri Hort Soc Ind VII 129 an account of the tree in Cuttack*

Habitat—A large deciduous tree of the sub-Himalayan tract from the Indus to Assam ascending to 2000 feet The *Flora of British India* states that it is found in the plains throughout India proper and distributed to Baluchistan and Afghanistan The extensive list of references given above may be accepted as indicating its distribution and it has been found necessary to abridge very greatly the enumeration that might have been given It may briefly be said to occur in every district in India many of its localities however being the result of the effort to extend its cultivation It is probable that its indigenous habitat is very much narrower than we are accustomed to think Neither Kurz nor Mason make any

BERGIA
sissoo

The Sissoo Tree

mention of its occurrence in Burma **Roxburgh** regards it as a native of Bengal and of the adjoining provinces to the northwards **Brandis** views it as a native of the sub Himalayan tract and adds generally gregarious mostly on sand or gravel along the banks of rivers or on islands extending 50 to 100 miles into the plains Believed to be indigenous also in Guzerat Baluchistan and Central India I have never seen it really wild outside the sub Himálayan belt Cultivated and often self sown throughout India thrives best on light soil and requires a considerable amount of moisture The old leaves turn reddish brown and begin to fall in December but continue to be shed up to February when the young foliage comes out continuing till April Flowers from March to June at times with a second flush between July and October the seed ripens from November to February and generally remains long on the tree **Beddome** says it only occurs as an avenue tree in the Madras Presidency

Mr J H Lace Assistant Conservator of Forests Quetta who has given much careful study to the plants of Baluchistan says **D Sissoo** is indigenous about the Harnai the Mehrab-Tangi and up to Sharigh (4 000 feet) The Wam Tangi Forests near the Harnai is chiefly composed of it where it grows up to 35 feet in height **Mr Mann** Conservator of Forests Assam says It occurs naturally only in the Eastern Duars of the Goalpara District in Assam With the exception of a few scattered trees in the Lakhimpur District up stream from Dibrugarh no Sissu is found in the Cachar or Sylhet Districts The Assistant Conservator of Forests Ajmere Merwara writes that while **D latifolia** and **D lanceolaria** are wild **D Sissoo** is cultivated The Conservator of Forests says it is cultivated in Sind and that plantations 20 years old exist It requires a good soil and care during its first year or two **Stewart** regards it as indigenous in the Kachhi Forest Panjáb on the islands of the Indus opposite Bannu The Conservator of Forests Northern Circle Madras (in a report forwarded through the Board of Revenue) says that Sissu is only found in cultivation in the Madras Presidency It does well on river banks as in the plantations on the Cauvery in Trichinopoly and fairly well on coast stands as at Musulpatam

Oil—The wood is said to yield an empyreumatic medicinal oil In a recent report from the Forest Department North Western Provinces it is stated that oil is expressed from the SEEDS

Medicine—The RASPIINGS of the wood are official being regarded as alterative (*Beddome*) It is considered by natives to be hot (*Stewart*) Useful in leprosy boils eruptions and to allay vomiting also in special diseases (*Biden Powell*) The ROOTS are said to be so astringent that they are neither eaten by rats nor ants The LEAVES and saw dust (raspings) in decoction are esteemed in eruptive and special diseases and to allay vomiting The OIL is also applied externally in cutaneous affections (*Atkinson Himalayan Districts*)

SPECIAL OPINIONS—§ The MUCILAGE of the leaves mixed with sweet oil is a good application in cases of excoriation A DECOCTION of the leaves is given in the acute stage of gonorrhœa (*Civil Surgeon F Anderson MB Bijnor*) The BARK made into pills with aromatics such as ginger &c checks cholera (*V Ummegadien Mettapollium Madras*)

Fodder—The young trees are liable to be browsed by cattle goats and camels (*Stewart*) but the arrangements for forest conservation prevent this as much as practicable

Structure of the Wood—Sapwood small white heartwood brown with darker longitudinal veins close and even grained seasons well very hard Annual rings not distinctly marked alternating dark and light coloured bands which run into each other

OIL
Wood
65
seeds
DICINE
splngs
66
Root
67
eaves
68
Oil
69
icilage
70
coction
71
Bark
72
DDER
73
MBER
74

Sissoo Wood

(G Watt)

DALBERGIA spinosa

The wood is very durable seasons well and does not warp or slip It is highly esteemed for all purposes where strength and elasticity are required Clifford says that in strength it is only inferior to *sal* while in many other useful qualities it surpasses it and has the advantage of being lighter For FELLOES and NAVES of wheels and carved work of every description for framings of carriages and similar work it is unsurpassed by any other wood owing to its fine seasoning and standing qualities It is extensively used for boat building carts and carriages agricultural implements in construction and especially for furniture

Roxburgh's account of this timber may be here given this tree yields the Bengal SHIP BUILDERS their crooked timbers and knees It is tolerably light remarkably strong but unfortunately not so durable as could be wished Formerly it was more extensively used for GUN CARRIAGES than it can be at present owing to the comparatively small supply With regard to its durability and strength as a wood for wheels Clifford writes The WHHEELS of our ordnance carriages have never failed however arduous or lengthened the service has been on which they have been employed of which no more striking example can be furnished than the campaign in Afghanistan about the most trying country in the world for wheels Some of our batteries served throughout the campaign went to Bamian and even to the Hindoo Koosh and came back again to India without a break down while Royal Artillery wheels built of the very best materials Woolwich could produce specially for Indian service almost fell to pieces after a few months exposure and service on the plains of India

It has been tried and found to be good for SLEEPERS and Mr Mc Master in the *Proceedings of the Institution of Civil Engineers* Vol XXIII 1863 says it will be really good for that purpose The wood makes excellent CHARCOAL Stewart recommended the cultivation of the tree for the purpose of railway FUEL and Mr Baden Powell while Conservator of Forests in the Panjab planted out large tracts of country for this purpose It is much planted as an AVENUE tree all over India and in forest plantations in the Panjab and Bengal At the Colonial and Indian Exhibition Conference on timbers Sir D Brandis is reported to have said The tree is chiefly found along the streams which emerge from the Himalaya Large trees became scarce about 60 years ago but the tree is now regularly and extensively planted An exhaustive report was prepared in 1826 by an eminent botanist Dr Wallich respecting the localities producing the *Sissu* which showed that the supply of large timber was at that time nearly exhausted *Sissu* can however be easily cultivated in India and on a large scale in fact almost as easily as Spruce in Europe Very extensive plantations have already been formed and they could be extended over a great area if a sufficient demand arose for the timber The tree has for example been cultivated in the south of India but the plantations are still too young to judge whether it will there attain any large size

Sissu wood might be exported from Calcutta

Sacred Uses—The tree is planted by the Hindus being viewed by them as sacred

Dalbergia spinosa, Roxb *Fl Br Ind*, II 238

Syn—D HORRIDA Grah DREPANOCARPUS SPINOSUS Kurz *For Fl Burma* I 337

Vern—*Yechinya* BURM

Habitat—A stiff erect shrub with the branches spine tipped frequent on the shores of the Eastern and Western Peninsulas and at Chittagong

TIMBER

Felloes
75
Naves
76

Ship building
77
Gun
carriages
78

Wheels
79

Sleepers
80

Charcoal
and Fuel
81

Avenue Tree
82

SACRED
83
84

ALBERGIA
volubilis

The Dalbergias

EDICINE
Roots.
85

Medicine — The **ROOTS** powdered absorb alcohol and a spoonful of the powder in a tumblerful of water is said to be sufficient to destroy in less than half an hour the effects of alcohol even in cases bordering on delirium tremens (*Kurs*)

IMBER
86

Structure of the Wood — Soft beautifully silvery white close and straight grained (*Kurs*)

87

Dalbergia stipulacea, Roxb Fl Br Ind II 237 Wight Ic t [453
Syn — *D FERRUGINEA* Roxb *D TINGENS* Wall *D CASSIOIDES* Wall
D LIVIDA Wall *D ROSTRATA* Grah

Vern — *Iatebiri* NEPAL *Tón nyok* LEPCHA *Garodosal* MICH *Dank talaungnwi* BURM

References — *Kurs For Fl Burm 346 Gamble Cat Darj Pl 29 129*

Habitat — A large climbing shrub of the Eastern Himálaya ascending to 4 000 feet also of Assam the Khásia Hills Chittagong and Burma

IMBER
88

Structure of the Wood — Soft greenish grey hard close grained very prettily marked with lines of different colours Weight 48lb a cubic foot

89

D sympathetica, Nimmo Fl Br Ind II 234

Syn — *D FRONDOSA* Wall *D FERRUGINEA* Hohen

Vern — *Petaguli* or *pentgul* *titavali vakayela* MAR *Titabli* GOA

References — *Dals & Gibs Bomb Fl 78 Dymock Mat Med W Ind 2nd Ed 236 Bomb Gas (kanara) XV I 433*

EDICINE
Bark
90

Habitat — A scandent plant armed with large curved thorns frequent on the hills of Western India **Dymock** says it is common near Bombay and Talbot that it is found at Kanara

leaves

Medicine — The **BARK** is used as a *lép* to remove pimples The **LEAVES** are in Goa employed as an alterative (*Dymock*)

91

D tamarindifolia, Roxb Fl Br Ind II 234 Wight Ic, t
242 Roxb Fl Ind Ed C B C 53 Gamble Mun Timb 124

Syn — *D LIVIDA* Wall *D MULTIJUGA* Grah *D BLUMEI* Hassk
DERRIS PINNATA Lour

Vern — *Ket* SYLHET *Damar* NEPAL

Habitat — A scandent species met with in the Eastern Himálayas — Nepál Sikkim Sylhet the Khasia Hills &c ascending to 4 000 feet **Kurz** says it is not unfrequent in the Andaman Islands and in Tenasserim (*For Fl Burm I 348*) Talbot reports its occurrence in the forests of Kanara

ODDER
leaves.

Fodder — The **LEAVES** resemble those of the tamarind and are eaten by cattle

93

94

D volubilis, Roxb Fl Br Ind, II 235

Vern — *Bhatia bankhara* HIND *Bir munga nari siris* SANTAL *Nubari URIYA Rongdi* MAL (S P) *Bhatia* KUMAON *Alei alai* MAR *Bandigarijana bandi guriginja* (Elliot doubts the correctness of these names) TEL

References — *Roxb Fl Ind Ed C B 536; Brandis For Fl 152 Kurs Fr Fl Burm 346 Elliot Fl Andh 22 Dymock Mat Med W Ind 2nd Ed 237 Indian Forester X 326 Gas N W P (Bundelkhand) 80 Himalayan Districts 309 Bomb Gas XV I (Kanara) 433*

Habitat — A large climber met with in the Central and Eastern Himálaya Oudh Pegu and Ceylon The Conservator of Forests Bengal, in a recent report states however that it also occurs in Orissa

EDICINE
oot-juice
95

Medicine — **Dymock** states that it is applied to aphthæ and is used as a gargle in sore-throat The **ROOT JUICE** with cummin and sugar is given in gonorrhœa

D 95

Products of India

Dammar	(G Watt)	DAMMAR
Fodder —According to the Rev A Campbell cattle and goats eat the leaves of this plant		FODDER
Structure of the Wood —Light brown hard, very tough		96
Dalchini , see <i>Cinnamomum Tamala</i> , C 1183		TIMBER.
Dalima , a name given in Orissa to a hard stone employed for making utensils, &c		97
Damasonium indicum , see <i>Stratiotes alismoides</i> , Linn		98
Dammar —A trade generic name for a series of resins separately recognised by specific appellations. Of these the following may be specially mentioned, the reference being given for each to further passages in the present work where fuller details will be found—		99
1st <i>East Indian Dammar</i> —Also known as 'Singapore' or 'White Dammar'. This is the true Dammar and is obtained from the species of <i>Dammara</i> described below, the best known of which is the Amboyna pine (<i>D orientalis</i>) a native of Malacca Borneo Java Sumatra &c		East Indian
2nd <i>Kauri or Cowdee Dammar</i> —A fossil resin derived from <i>Dammara australis</i> the chief supply of which is obtained from New Zealand. An extremely fine yellow amber like resin		100
3rd <i>Sal Dammar</i> —Known in Indian commerce as <i>ral</i> . This is the stalactitic resin obtained from <i>Shorea robusta</i> , which see		Amboyna
4th <i>Black Dammar</i> —The resin obtained from <i>Canarium strictum</i> , Roxb which see Vol II C No 285. Some interesting commercial facts regarding this and other Indian gums were published by the Public Works Department of the Government of India in a special report derived from correspondence with the Local Governments. This report appeared in 1871 and the following pages deal with Black Dammar—2 3 4, 6 7 8 9 10 13 23 30 and 69		Pine
5th <i>Rock Dammar</i> —This is obtained from two species of <i>Hopea</i> , viz, <i>H odorata</i> a native of Burma and <i>H micrantha</i> a native of Malacca Borneo and Sumatra &c—(See <i>Hopea</i> .)		101
6th <i>White Dammar</i> or Dhoop resin—This name is often applied to the first Dammar enumerated above, but also to the resin derived from <i>Vateria indica</i> , which see		Kauri
7th <i>Green Dammar</i> —A term given to the resin of <i>Shorea Tumbug gais</i> , which see		102
8th <i>Pwenyet (or Poon yet) Dammar</i> —A resinous or waxy substance obtained from certain trees in Burma. It is the hive of a peculiar bee, but much doubt exists as to the true nature and source of the substance. See <i>Pwenyet</i> in this work and also Dr Forbes Watson's account of it in the report on Gums and Gum resins published by the India Office (1874) page 95		Sal
In the countries where they are obtained the dark coloured and impure dammars are used for caulking boats and other such purposes. The purer qualities are exported to Europe and America where according to their specific properties they are used for various purposes. Nearly all are however employed as varnishes the purer qualities being employed to give a gloss to cotton and other fabrics. The less pure forms are used as varnishes by coach builders and painters. The finest quality of all is that known in the trade as <i>Kauri</i> or <i>Cowdee</i> resin. This is a fossil dammar derived from <i>Dammara australis</i> the supply of which mainly comes from New Zealand. The exports of this substance from New Zealand average between 2 500 and 6 000 tons annually the larger quantity either going direct or <i>via</i> London to the American market		103
		Black
		104
		Rock.
		105
		White
		106
		Green
		107
		Pwenyet
		108

**DAMMARA
orientalis.****The Pines****DAMMARA, Lamb Gen Pl III 436; Fl Br Ind, V, 650**

Lambert (*Genus Pinus* smaller edition) accepted Salisbury's position in separating the species of Dammar from the genus *PINUS* he however preferred the name *Dammara*, Rumph to *Agathis* Salisb the result being that *Dammara* has become better known In a work like the present, which is more or less of a commercial character it has been thought desirable to preserve the older name *Dammara* and as *Agathis* has not been dealt with in the first volume of this work it becomes all the more necessary to give the economic information in the present place The *Flora of British India* adopts *Agathis* in preference to *Dammara*.

109 Dammara australis, Lamb Genus Pinus t 54**THE KAURI PINE****Syn** — *AGATHIS AUSTRALIS* Salisb

References — *Gordon Pinetum* 108; *Gamble Man Timb* 394 *Indian Forester*, III 177 184 V 104 VII 363 XII 476 553 *Mysore and Coorg Gaz* I 66 *Smith Dict Econ Pl* 149, *Royle Productive Resources* 68 *Mueller Extra Tropical Pl* 102; *Beddome Fl Sylv* 227 *Trans Agri Hort Soc V* 110 VI 103—105

Habitat — A native of New Zealand now confined to the North Island, but formerly more extensively distributed Cultivated in most tropical and sub tropical countries The tree is being experimentally cultivated in India but apparently not with the vigour which the importance of the subject deserves *Royle* alludes to a consignment of 353lb of seed of Dammar having been consigned to India in 1796 and in Mysore the descendants (presumably) of this stock may still be seen *Beddome* alludes to *Dammara* as represented on the mountains of Madras

**RESIN
110**

Resin — In the above remarks regarding Dammar resin some of the main features of the trade have been indicated In *Lambert* a work quoted above is reproduced *Rumphius* interesting article on the subject one of the most important which has as yet appeared Some idea of the value of the resin may be obtained from the fact that the imports into Great Britain are stated to have been worth £200 000 The tree is rapidly being exterminated in New Zealand as its timber is of great value and it is problematic how long the supply of fossil resin will continue to meet the growing demand The tree attains a height of 120 to 150 feet with a circumference of 24 feet

111 D orientalis, Lamb; Genus Pinus t 55**THE AMBOYNA PINE****Syn** — *D. ALBA* Rumph *AGATHIS LORANTHIFOLIA* Salisb *Fl Br Ind V* 650**Vern** — *Theet men* (according to *Mason*) *Burm*

Habitat — A large tree native of Amboyna and Ternate of the islands of Molucca Java Borneo &c *Mason* in his list of the plants of Burma enumerates this species but *Kurz* makes no mention of it *Wallich* states that it is found in Tavoy and the *Flora of British India* that it is a native of Penang and Perak

**RESIN
112**

Resin — The timber is of little value but the tree affords large quantities of a transparent resin known as Dammar This is conveyed to most parts of the world being used in India as incense and for medicinal purposes In Europe it is largely used like the resin of the above species for purposes of varnishing and for waxing or polishing fabrics (*O Shaughnessy, Beng Disp*, p 617)

D 112

The Nepal Paper Plant.

(G Watt)

DAPHNE
cannabina.

It seems probable that this species might with great ease be grown in Burma and possibly also in the Andaman Islands

Damson, see Plum and also *Prunus communis*, *Huds*

Dana—a grain and especially gram but the name is also given to many plants such as the *Anardana Ramdana* species of *Amarantus Shakar dana Colebrookia oppositifolia*, *Behdana Cydonia vulgaris*, *Hasardana Euphorbia thymifolia*, *Kaladana Ipomoea hederacea* &c.

II3

Dandelion, see *Taraxacum officinale*, *Wiggers COMPOSITÆ*

Dandy, Banghy and Palanquin Poles Woods used for—

II4

These woods are elastic and capable of bearing a considerable weight They might accordingly be employed for cart shafts Dandy poles are used by many races of India to carry loads across the shoulder a pack age being balanced at each extremity

Acer cultratum

A pictum.

Bambusa arundinacea

Betula Bhojpattra.

Cotoneaster obtusa

Cupressus torulosa

Diospyros melanoxylon

Ficus bengalensis

F indica

Fraxinus floribunda

Fraxinus xanthoxyloides

Grewia oppositifolia

G tiliaefolia

G vestita.

Lagerstræmia parviflora

Quercus dilatata

Q semecarpifolia.

Taxus baccata

Ulmus campestris

Danewort, see *Sambucus Ebulus*

DAPHNE, Linn Gen Pl III 190

Daphne cannabina, Wall Fl Br Ind V 193 THYMELÆACEÆ

II5

POPULARLY KNOWN AS THE NEPAL PAPER PLANT

Syn—*DAPHNE PAPHRACEA* Wall D ODORA and *BHOLUA* Don D PAPHRIFERA Ham MS

Vern—*Set barawa satpura* HIND; *Dunkotah gande kaghuti bhullu soang* NEPAL *Dayshing* BHUTIA *Balwa* or *bhalua chamboi barua* KUMAON *Niggi mahadeo-ka-phél* (God's Flower) *rehu* (SIMLA) PS *Hsele* BURM

References—*Brandis For Fl* 386 577; *Gamble Man Timb* 315 *Cat of Trees Shrubs and Climbers of Darjeeling* 67 *Stewart Pb Pl*, 1889 *O'Shaughnessy Beng Dispens* 7 531 *Baden Powell Pb Pr*, 515 *Atkinson Him Dist* 378, 574 795—97 *Drury U Pl* 178; *Royle Ill Him Bot* 321 *Christy Com Pl and Drugs VI* 13 *Royle Fib Pl* 311 *Spons Encyclop* 947 *Bal four Cyclop I* 888 *Treasury of Bot* 383 *Kew Off Guide to the Mus of Ec Bot* 47 *Special Report on Nepal by Dr Gimlette Stewart's Report of a tour in Hasara (in Jour Agri Hort Soc India XIV, p 13* *Hodgeson Jour As Soc Beng*, 18; *Madden Jour As Soc Beng XVIII* 610 *Asiatic Res XIII* 385; *Trans Agri. Hort Soc India V* 220-231; *Conservator of Forests Assam* in a recent report states that the plant is wild in the Khasia hills; *Conservator of Forests N W P* reports that though the plant is common in the Jannasar Division it is not used for paper-making *Simla Gazetteer* 12

Habitat—A large shrub or small tree found on the Himalaya from the Indus to Bhutan between altitudes of 3,000 and 10,000 feet, also on

DAPHNE
cannabinina**The Nepal Paper Plant**

the Khásia and Naga Hills one of the most abundant bushes on the hills between Manipur and Burma

Gamble remarks that this species blossoms from November to February, and that the fruits ripen and become red in May. He adds that the flowers are exceedingly sweetly scented (*List of Darjeeling Trees &c* p 67). Brandis says it flowers in March and April also in autumn but he makes no mention of its being sweetly scented. The synonym *D. odora* Don would most probably imply that the flowers were scented. In the Simla district this species flowers from the middle of December to the end of February or middle of March but the flowers are then devoid of any smell. It is probable that under certain circumstances it may have two seasons of flowering in one of which it may be scented. Most authors describe the plant as a large shrub and Brandis says it attains a height of seven to eight feet. In Simla it is one of the most abundant plants with *Skimmia Laureola* and *Sarcococca prunifolia* forming the forest under brushwood but none of these plants much exceed three feet in height.

FIBRE
Bark
110

Fibre — The well known Nepál paper is said to be made from the BARK of this and the other species of *Daphne* and of the allied plant *Edgeworthia Gardneri*. European interest in this paper may be stated to have originated in Lord Auckland's enquiry regarding it in the year 1837. It was of course known to the natives of India for several centuries prior to that date and official records on daphne paper dated 1817, were submitted to His Lordship for inspection. Very little has since been added to our knowledge of the subject and the reports quoted below were first published about the beginning of the present century.

Setburosa
117

The process of making paper from this plant is thus described in the *Asiatic Researches*. After scraping the outer surface of the bark what remains is boiled in water with a small quantity of oak ashes. After the boiling it is washed and beaten to a pulp on a stone. It is then spread on moulds or frames made of bamboo mats. The *Setburosa* or paper shrub says the same writer in the above Journal is found on the most exposed parts of the mountains and those the most elevated and covered with snow throughout the province of Kumáon. In traversing the oak forests between Bhumtah and Ranigur and again from Almorah to Chimpanat and down towards the river the paper plant would appear to thrive luxuriantly only where the oak grows. The paper prepared from its bark is particularly suited for cartridges being strong tough not liable to crack or break however much bent or folded proof against being moth eaten and not subject to damp from any change in the weather besides if drenched or left in water any considerable time it will not rot. It is invariably used all over Kumáon and is in great request in many parts of the plains for the purpose of writing *misub-namahs* or genealogical records deeds &c from its extraordinary durability. It is generally made about one yard square and of three different qualities. The best sort is retailed at the rate of 40 sheets for a rupee and at whole-sale 80 sheets. The second is retailed at the rate of 50 sheets for a rupee and 100 at wholesale. The third of a much smaller size is retailed at 140 sheets and wholesale 160 sheets to 170 for a rupee' (*Drury U Pl 178*).

Cartridges
118

Another early account of *Daphne* paper and the process of its manufacture is that given by the late Mr B H Hodgson (*Four As Soc Beng Vol I 81*), then Resident at the Court of Nepál. In describing this industry (which differs but little from that pursued with ordinary paper making in India), it may suffice to indicate briefly the main features of Mr Hodgson's account of the process materials and manipulation. The reader, however, will find Mr Hodgson's complete article

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(G Watt)

**DAPHNE
cannabina.**

reproduced in Atkinson's *Himalayan Districts* page 795 also in the *Trans Agri Hort Soc Ind V 228 231*

Mr Hodgson says a stone mortar is required and a mallet or pestle of hard wood proportioned to the mortar and the quantity of bark it is desired to pulp. The alkali employed is the ash of oak wood. This is placed in a basket of close wicker work and water allowed to percolate through the fluid thus obtained is the alkali used. The freshly peeled bark is then placed in an open metallic vessel (the heat necessary being too great to allow of the employment of earthen boilers) and over these is poured the alkali. Four seers of oak ash through which five seers of water have been slowly poured afford the alkaline solution sufficient to do a large handful of the bark. After the solution has reached the boiling point the bark is placed in it to the extent of as much as will float in the alkaline solution.

The boiling is then continued for half an hour when the alkaline juice will be found to be nearly absorbed and the bark quite soft. This is now carried to the stone mortar and beaten with the mallet until reduced to a pulp. It is next freely stirred in another vessel containing pure water until it loses all stringiness and will spread itself out in the water when shaken. The pulp is now ready for the frame. This has stout wooden sides so that it may readily float and a bottom of cloth the meshes of which are so regulated as to retain all the pulp but allow water to pass through easily. In throwing the pulp on the frame it is passed through a sieve so as to remove the lumpy portions and impurities. The sieve is of the same size as the frame. It is placed on the top of it and both are allowed to float on the water of the cistern. When sufficient pulp has passed through to cover the frame with a layer of the desired thickness the sieve is removed and while holding the frame in the left hand a dexterous movement of the water and pulp with the right causes it to diffuse uniformly over the surface of the frame. The frame is then raised carefully from the water so as to allow of drainage without disturbing the film of pulp. The paper thus made is partially dried on the frame by being exposed edgewise to a fire. It is then removed and if desired is polished by means of a conch shell while placed on a flat board. A peculiarity of Daphne paper consists in the fact that it may be polished until it can be used for writing on without the aid of any sizing material.

Mr Atkinson adds in his more recent account of this paper that it is manufactured exclusively by the tribes inhabiting Cis Himalayan Bhot known as Murmis Lepchas &c or generically as Rongbo in contradistinction to the Sokpo the name given to the inhabitants of Trans Himalayan Bhot. The manufactories are mere sheds established in the midst of the great forests of the upper ranges which afford an inexhaustible supply of the material as well as of wood-ashes and good water both of which are essential to the manufacture of the raw material into the blocks from which the paper is made. Dr Royle (*Fibrous Plants*) mentions that at the Great International Exhibition of 1851 a sample of Nepal paper was exhibited of such size as to occasion universal surprise. He continues. This paper is remarkable for its toughness as well as its smoothness some of it in the form of bricks of half-stuff was sent to England previous to the year 1829. As the quantity was not sufficient for a complete experiment a small portion of it was made into paper by hand. An engraver to whom it was given for trial stated that it afforded finer impressions than any English made paper and nearly as good as the fine Chinese paper which is employed for what are called Indian paper proofs. Dr Campbell (see *Agri Hort Soc Trans V 222*) repeats Mr Hodgson's statements and describes the paper made by the Bhoteahs as strong and almost as

FIBRE.

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cannabina

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FIBRE.

durable as leather and quite smooth enough to write on. For office records he says it is incomparably better than any Indian paper. It is occasionally poisoned by being washed with preparations of arsenic in order to prevent the destruction caused by insects. Many of the books of Nepal written on this paper are said to be of considerable age and the art of making the paper seems to have been introduced about 500 years ago from China and not from India. The paper, he continues, is so pliable elastic and durable that it does not wear at the folds during twenty years whereas English paper especially when eight or ten sheets are folded up into one packet does not stand keeping in this state uninjured for more than four or five years. He then refers to a copy of a Sanskrit work which he inspected the date of transcription of which was A D 1687 or 150 years prior to his writing of it that it was in a perfect state of preservation having all that time withstood the ravages of insects and the wear and tear of use.

The writer had the pleasure recently to receive from Dr Gimlette Residency Surgeon Nepal some interesting facts regarding Nepal economic products and industries. The following passage as supplementing the facts derived from the earlier writers (briefly reviewed above) may be here taken from Dr Gimlette's account of paper making — 'This paper justly celebrated for its toughness and durability is manufactured from two or three forms of *Daphne* and also from *Edgeworthia Gardneri*, the last mentioned producing the finest and whitest paper. It is manufactured by the cis alpine Bhotias who inhabit the mountains between Nepal proper and Thibet. The barks of the different species are generally mixed together that of *Daphne papyracea* being seldom used alone except for cordage. *Shosho arbad*, *shedbarwa* or *letbarwa* are names given by the Bhotias to the *Daphne* shrubs. *Kaghuti bara kaghuti* and *chota kaghuti* are names also used but all seem to be somewhat loosely applied. The paper sells in the Katmandu bazar at the rate of six annas per twenty four large sheets. Dr Campbell reported in 1837 that the price was then 160 sheets per Nepalese rupee to 400 or from 9 to 13 Company's rupees per maund. The transport to Patna (a distance of 200 miles) he estimated at Rs 12 and the price in Patna only a little more than in Catmandoo. This latter fact he explains by the circumstance of there being a monopoly of the sale of paper kept up by the Nepalese Government.

Throughout the greater part of India *Daphne* paper may be purchased so that the manufacture by the hill tribes must be very extensive. Around Simla it is not made indeed the people seem utterly ignorant of the value of the plant—one of the commonest of wild plants. They prefer to make their ropes from *Grewia oppositifolia*, and alike neglect the *Daphne* and the wild hemp. This seems to be the state of affairs on most of the outer ranges. At Nagkanda (some 40 miles to the north of Simla) the writer came across some men carrying loads of *Daphne* bark and was told it was being carried to the east where it was made into paper. This fact is in support of Stewart's statement that the Panjab Himalayan tribes do not make the paper though it is well known to be extensively made in Kumaon. The Forest Officer of Jaunsar reports that, though the plant is very common in all the forests above 5,000 feet paper is not made of its bark, but that the local supply used for Patwari maps &c. is imported from Kumaon. Mr G. G. Minniken Forest Officer of Bashahr recently informed the writer that *Daphne cannabina* was not used in his district for paper making though it was probably exported to be used as an adulterant.

Chemistry of *Daphne*.—In the chemical analysis of the fibres of India published by Messrs Cross, Bevan and King *Daphne* is placed

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(G Watt)

**DAPHNE
cannabina.****CHEMISTRY**

at the bottom of the list since it possesses of all the Indian fibres examined by these gentlemen the lowest amount of cellulose namely 22.3 per cent. Chemistry in the verdict of percentage of cellulose as an indicator of merit is thus in opposition to practical experience for although it would not perhaps pay to export the bark or paper half stuff of this (or indeed of any other plant) to Europe for the paper making industry pure and simple there can be hardly any room for doubt but that the **Daphne** in many respects are the best of all Indian paper materials. The chemical test given above may however be accepted as demonstrating their unsuitability for textile purposes. In *Spons' Encyclopædia* (Vol. I 947) an old report regarding the fibre is reproduced namely — The inner bark prepared like hemp affords a very superior paper material. The paper made from it is particularly suitable for cartridges being strong tough and not liable to crack or break however much bent or folded it is proof against being moth eaten and is not affected by change in the weather if drenched or left in water for a considerable time it will not rot. It is in universal request locally for writing deeds and records on being quite smooth and almost indestructible. It may however be pointed out that the process described above (by means of which the hill tribes manufacture their **Daphne** paper) is one mainly characterised by the very slight amount of alkali necessary to produce the pulp. A crude alkaline ash with the boiling conducted for only half an hour and that too in an open vessel is all that is necessary. Such a treatment may not completely reduce the fibre though it proves sufficient to produce a workable pulp. **Messrs Cross Bevan and King** urge that the only safe criterion of the merits of a fibre is obtained from its percentage of cellulose and that being so **Daphne** would be the most worthless of Indian fibres. The writer has on several occasions ventured to express an opinion opposed to this somewhat sweeping conclusion but has had to admit that he bases his comparative want of faith in the cellulose theory on practical and not chemical considerations. The present seems a strong case in point. **Daphne** fibre as a paper material holds the foremost place among Indian paper stuffs in opposition to its low percentage of cellulose and thus seems to call for extended research since chemistry must undoubtedly be able to account for this fact. It would almost seem as if the expeditious and wholesale modern methods of paper making indeed of fibre extraction generally removed the materials of vascular concretion or disturbed conditions of the ultimate cellulose fibrils that were essential to their strength as textile or paper materials. The loss by weight and the injury to strength effected by a strong boiling alkali and under a high pressure does not seem a conclusive proof that with some other process the fibre thus condemned would not be found to possess properties of great merit. At all events **Daphne** paper as made in India will endure for many years under a treatment that in a few weeks days or even hours would render the modern papers produced in Europe perfectly worthless.

The figures of analysis published by **Messrs Cross Bevan and King** regarding **Edgeworthia** curiously enough confirm in a remarkable manner **Dr Gimlette's** statement that the paper made from that plant is superior to that from **Daphne cannabina**. Their analysis is as follows — Moisture 13.6 per cent. Ash 3.9 loss by hydrolysis for five minutes in soda alkali 21.6 for one hour 34.7 amount of cellulose 58.5 per cent. mercerising 16.5 increase of weight on nitration 12.6 loss by acid purification 8.3 amount of carbon 41.8 per cent. It is to be regretted that these chemists did not furnish a similar complete report of **Daphne** so as to allow of comparison. They seem to have been so disappointed with the low per

**PHNE
ereum**

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ISTRY

centage of cellulose in *Daphne* as to have considered it not deserving of further investigation. Their published results are however sufficient when taken in the light thrown on the subject by Dr Gimlette to suggest the possibility that past writers may have been in error in ascribing the high merit of the Nepal paper to *Daphne cannabina*—the *D. papyracea* of the older authors. It is just possible that to *Edgeworthia Gardneri* the merit of the Nepal paper is due. If this be so future effort should be directed towards extending our knowledge of this comparatively scarce plant and of rapidly undeceiving the public mind of a misleading error. In this consideration the curious fact may be called to mind that Nepal paper making is confined to the Central and Eastern Himalaya (the habitat of *Edgeworthia*) and is not practised in the Panjáb where *Daphne cannabina* is so abundant but *Edgeworthia* absent (*Edgeworthia* is the *Aryli* and *Daphne involucrata*, the *chhota aryli*.)

In the absence of a satisfactory investigation of the merits of the fibres obtained from the individual species of *Daphne*, the above account of *Daphne* fibre and paper may in the present state of our knowledge be viewed as applicable to *D. cannabina* conjointly with that given under the species below.

Sacred Uses—The flowers of this and perhaps also of all the Indian *Daphnes* are used by the Hindus as offerings to their idols.

Structure of the Wood—White moderately hard. Flowers very sweet scented.

**CRED
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MBER
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***Daphne involucrata*, Wall Fl Br Ind V 193**

Syn—*DAPHNE LONGIFOLIA* Meissn. *D. WALLICHII* Meissn. *ERIOSO-LENA WALLICHII* Meissn. *SCOPOLIA INVOLUCRATA* C. A. Mey.

Vern—*Shedbarwa chhota aryli* NEPAL.

Habitat—A shrub of the Eastern Himalaya the Khásia Hills Upper Assam East Bengal and Burma. Gamble says that this species flowers in January and February and that the fruits which are black ripen in May. Being an East Himalayan species this is not described by Stewart nor by Brandis. Gamble however distinguishes between *Daphne Wallichii*, Meissn. (the *chhota aryli*) and *D. longifolia*, Meissn. (the *Shedbarwa*) and he states that while they both flower at the same time the latter does not mature its black fruits till November and December (*List of Trees &c in Darjeeling District* p. 67).

Fibre—The BARK is used in the manufacture of Nepal paper.

**IBRE
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***D. Mezereum*, Linn**

MEZEREON Eng. **ECORCE DE MEZEREON** DE GARON DE LAUREOL DE THEYMELFE BOIS GENTIL Fr. **KELLERHALS SEIDELBASTRINDE** Kfllerhalsrinde Germ. **MEZEREON** It. **MEZEREON** Sp.

Vern—*Mezereon* or *masariyun* ARAB. *Masrium* or *masariyun* PERS.

References—*Brandis For Fl* 384. *Gamble Man Timb* 315. *Pharm Ind* 188. *O'Shaughnessy Beng Dispens* 530. *Mooden Sheriff Supp Pharm Ind* 174; *Dymock Mat Med W Ind 2nd Ed* 673. *Fluck & Hanb Pharmacog* 540. *U.S. Dispens 15th Ed* 941. *S. Arjun Bomb Drugs* 118. *Murray Pl and Drugs Sind* 109. *Irvine Mat Med Pat* 56 73 122. *Birdwood Bomb Pr* 75. *Royle Ill Him Bot* 321. *Spons Encyclop* 818 1414. *Balfour Cyclop I* 889. *Treasury of Bot* 383. *Ken Off Guide to the Mus of Ec Bot* 113. *Year Book Pharm* 1873 91 92 1874 628. *Irvine* 56 73 122.

Habitat—A deciduous shrub with pink flowers in lateral clusters native of North East Europe from Italy to the Arctic regions and eastwards to Siberia, &c. The flowers appear in spring before the leaves and

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Mezereon

(G Watt)

DAPHNE
Mezereum

are succeeded by red berries. Although it is occasionally met with in Britain by most writers it is there viewed as an introduced plant.

It is said by Mr Murray to be common in the Panjáb Himálāya and to be cultivated in gardens as an ornamental shrub. It may be cultivated but is certainly not a wild plant on the Himálāya nor anywhere in India.

History—The Mezereon according to Muhammadan physicians is a leaf of which there are three kinds white yellow and black. The white is described as the best. The word *Masariyun* is by most authorities said to be of Greek and not Arabic origin and the plant referred to is thought to be the *Daphne Mezereum* of botanists. At all events that plant has held a place in European medicine for the past 300 years but the parts used are the bark or the berries and not the leaves as described by Mir Muhammad Husain and other Muhammadan writers. Thus very considerable confusion exists and it seems probable that the *Kamela* which Irvine and other modern Indian authors refer to *Daphne Mezereum* is not the Mezereon of European writers. Irvine remarks that the seeds are imported from Cabul and used as an irritant. In another place he again reverts to the subject of *Daphne Mezereum* but calls it the *Mameera* and states that this root is like Mezereon and used in the same way. On a still further page and again under *Daphne Mezereum* he gives another account calling the plant (in the vernacular) by the names of *Uzul ool* and *Masrioon*. The root he says brought from Persia is used as a stimulant sudorific (*Conf* with remark under *D oleoides*, para MEDICINE). Dr Dymock (under *Masariyun*) gives an account of the drug as described by Mir Muhammad Husain but makes no mention of any drugs sold at the present day in Bombay drug shops under that name. Assistant Surgeon Sakham Arjun however says that *Masrium* is the Mezereon root of the Pharmacopœia. It is chiefly used by the Unani Hakeems in venereal complaints. Dutt (in his *Materia Medica of the Hindus*) and Ainslie (in his *Materia Indica*) are silent as to Mezereon and while Sir William O'Shaughnessy gives what appears to be an outline of the leading facts attributed to the European drug he says nothing as to its uses in India. In the Indian Pharmacopœia both *Daphne Mezereum* (the Mezereon) and *D Laureola* (the Spurge Laurel) are made official. In France and the United States *D Gnidium* is also official. It thus seems probable that as all the *Daphnes* possess more or less the same chemical properties if the *Masariyun* of the Indian bazars is a *Daphne* at all it will be found to be one or other of the species indigenous to India or Persia but not the *Daphne Mezereum* of Europe.

Medicine—Since the probability exists that the *Masariyun* of India is an indigenous species of *Daphne*, or at all events that any *Daphne* might be used as such it may not be out of place to give here a brief review of the medicinal and chemical properties assigned to the drug in Europe. Mezereon when taken internally is supposed to be alterative and sudorific and to be useful in venereal rheumatic and scrofulous complaints. Externally applied it is a rubefacient and vesicant but to obtain the last effect it has to be first steeped in hot vinegar and kept in contact with the skin by means of a bandage. In English medicine it is prescribed as an ingredient of the Compound Decoction of Sarsaparilla. An ethereal extract of the BARK has been recommended, however as an ingredient in a powerful stimulating liniment.

Chemistry—Mezereon contains a crystalline bitter glucoside daphnin which by the action of acids is converted into daphnetin. An acid resin is contained in the inner bark. Daphnin is also contained in the bark of other species of *Daphne*.

HISTORY
125MEDICINE
Mazariyun
126Sarsaparilla
127
Bark.
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CHEMISTRY
129

DAPHNE pendula**Daphne Paper Plants****CHEMISTRY**

Umbelliferone has been obtained by dry distillation of the resinous acid of the bark.

A greenish yellow oil has been extracted from the **Daphne Mezereum** seeds which is stated to act as an irritant and vesicant (*Prof Warden*)

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Daphne oleoides, *Schreb Fl Br Ind V, 193 Royle Ill, t 81*

Syn—**DAPHNE MUCRONATA** *Royle, D CORIACEA* *Royle D BUXIFOLIA Vahl D ACUMINATA Boiss* ^p **D CASHMIREANA** *Meissn*

Vern—*Kutild kankhan gandalun shalangri sosho shing mashur swana jikri dona channi niggi kagsari sind kamsan sonai, shi kak* **PB Laghuna AFG Pech SIND**

The above vernacular names are given by most authors under the old synonym of **D mucronata**

References—*Brandis For Fl 385 Gamble, Man Timb 315 Stewart Pb II 189 Aitchison Cat Pb and Sind Pl 130 Aitchison Kuram Valley Flora (Jour Linn Soc XVIII) 25 Baden Powell Pb Pr 577 Atkinson Him Dist 574 Royle Ill Him Bot 321*

Habitat—A small much branched shrub met with on the Western Himalaya from Garhwāl westward to Murree the Sulman Range and Afghānistān occurring at altitudes of from 3 000 to 9 000 feet

Regarding the season of flowering of this species there seems to be some confusion **Brandis** says that it occurs in September and October and the fruits which are orange or scarlet mature in May and June As if to contrast this statement with an error made by **Stewart** he gives the following paranthetic quotation (blossoms May July at times October the fruit usually ripening June October —*Stewart*) **Gamble** refers to the plant as met with in the Simla District if it does so it must be extremely rare The writer has not as yet come across it in Simla but with reference to the season of flowering he has samples of the plant from Quetta in full flower and dated May and from Pangl dated June

Medicine—**Aitchison** in his *Flora of Kuram Valley* says that the roots of this plant are used internally when boiled as a medicine being purgative In another place he says Camels will not eat this shrub except when very hungry It is poisonous producing violent diarrhoea I feel certain that much of the mortality of camels in the Kuram division was due to the prevalence of this shrub

The BARK and LEAVES are used in native medicine The BERRIES are eaten to induce nausea **Stewart** refers to this plant as hurtful to camels thus making the same observation as recorded by **Aitchison** **Stewart** further says the bark is used by women in Kanāwar for washing their hair and adds that it has been tried for paper making

It seems highly probable that the **Mezereum** which **Irvine** and other writers mention as imported into India from Afghānistān and Persia is this plant and not the true **D Mezereum**

Spirit—**Brandis** says that on the Sutlej a spirit is distilled from the BERRIES

MEDICINE**Roots****131****Bark****132****Leaves.****133****Berries.****134****SPIRIT BERRIES.****135****136**

D pendula, *Sm Fl Br Ind V, 194*

Syn—**DAPHNE MONTANA** *Meissn ERISOLENA MONTANA* *Blume*

Reference—*Kurz For Fl Burm II 333*

Habitat—A smaller plant in all its parts otherwise doubtfully distinct from **D involucreta** met with on the hills between Nattoung and Moulmein Burma **Kurz** says it occurs on the damp hill forests of the Martaban east of Tounghoo at 5 000 to 6 000 feet elevation, and flowers in April

Fibre—It seems probable that this plant affords the Nepāl paper said to be made in Burma and the Straits

FIBRE**137****D 137**

Darma Mats	(C Watt)	DARMA.
Daphnidium , <i>Nees Gen Pl, III 163</i> Reduced to Lindera , <i>Thunb., Fl Br Ind V., 182</i>		
Daphniphylopsis capitata , <i>Kurs</i> see <i>Nyssa sessiliflora</i> , <i>Hook f, Fl Br Ind II 747</i> CORNACEÆ		
DAPHNIPHYLLUM , <i>Bl Gen Pl III 282</i> [EUPHORBIACEÆ		
Daphniphyllum glaucescens , <i>Blume, Fl Br Ind V, 353</i>	[1878-9	138
Syn —D ROXBURGHII <i>Basll</i> GOUGHIA NEILOHERRENSIS <i>Wight Ic t</i>		
Vern — <i>Nir chappay</i> (by the Badagas) NILGIRI HILLS		
References — <i>Beddome Fl Sylv t 288</i> <i>Gamble Man Timb 384</i> <i>Man Madras Adm Report II 110</i> <i>Balfour Cycl Ind I 889</i> ; <i>Thwaites Enum Ceylon Pl 290</i>		
Habitat —A small tree met with in the Nilgiri and Pulney hills South India and Ceylon. It is a highly ornamental foliage tree on account of which it is being cultivated in shrubberies		
Structure of the Wood —Very inferior but makes excellent fuel		Timber
D himalayense , <i>Muell Fl Br Ind V 354</i>		139
Habitat —A small tree very much like the preceding but found on the Himálayas from Kumáon to Upper Assam and Burma at altitudes from 4 000 to 9 000 feet		140
In <i>Atkinson's Himalayan Districts p 379</i> it is said to be known as <i>Rakt chandan</i> and <i>Rakt angliya</i> and is frequently used in marking the <i>tika</i> mark on the forehead. The <i>Rakt chandan</i> of most writers is <i>Pterocarpus santalinus</i> or <i>Adenanthera pavonina</i> , the wood of either of which is in the plains used for marking the forehead		DOMESTIC 141
Dárchíní or Dálchíní , see <i>Cinnamomum Tamala</i> , <i>Fr Vol II, C 1183</i>		
Darengri — <i>Balfour</i> mentions this as a name given in Kashmír to a leaf used in dyeing. The writer is unable to discover what plant is meant		142
Dari , see <i>Carpets</i> , <i>Vol II, C 627</i>		
Darmá , see <i>Mats and Matting</i>		143
It seems probable that the true <i>darmá</i> mat is that made of <i>Phragmites Roxburghii</i> , var <i>angustifolia</i> . The reeds are split open and plaited into mats. Mr T N Mukharji however in his work (<i>Art Manufactures of India p 310</i>) says 'Bamboo mats called <i>Darma</i> are largely employed in Eastern Bengal for the construction of the walls of houses'. The writer's experience of Bengal goes towards the conviction that though similarly constructed and like the true <i>darmá</i> mats used in house construction bamboo mats are not generally designated <i>darmá</i> mats		
At a conference held at the Colonial and Indian Exhibition mats of the <i>Phragmites</i> reed were shown as also those of split bamboo the gentlemen who examined these were of opinion a trade might be done in the former but not in the latter. The contention as to what is or is not <i>darmá</i> is therefore of little importance as compared with the distinction urged above of sending <i>Phragmites</i> mats to Europe in preference to bamboo in any efforts towards opening up trade in these articles. This explanation has been thought necessary since in his chapter on Mats Mr Mukharji makes		

DATISCA
cannabina**The Akalbir**

no mention of the reed mats here specially indicated The plant from which they are made is abundant on all the islands and sandy river banks in Bengal and the trade in making and selling these mats is very extensive See *Phragmites Roxburghii*

Dates and Date Palm, see *Phoenix dactylifera*, Linn

DATISCA, Linn Gen Pl I 844**144 Datisca cannabina**, Linn Fl Br Ind II 656 **DATISCEÆ**

Syn — *D. NEPALENSIS* Don

Vern — *Akalbir* or *ka'b* *bhaig jala* HIND *Akalber* *bajr* or *bhang jala* N W P *W flangel* KASHMIR *Akilb r eqilbir* *bhang jala* *drinkhari sida atsu* PB *Akalbar* HIND IN BOMB (*Dymock*)

References — *Gamble Man Timb* 207 *Stewart Pb Pl* 191 *Don Prodr Nep* 203 *Dymock Mat Med W Ind* 2nd Ed 355 *Murray Pl and Drugs Sind* 43 *Baden Powell Pb Pr* 372 *Atkinson Him Dist* 724 774 *Liottard Dye* 90 96 *Wardle Repo t on the Dyes of India* p 24 *Linnaean Soc J ur* XIX, 4 *Balfour Cyclop I* 897 1005 *Robinson Gleanings from French Gardens* p 42

Habitat — A tall erect herb resembling hemp hence the specific name It is met with in the temperate and sub tropical Western Himalaya from Kashmir to Nepal at altitudes from 1000 to 6000 feet but is by no means a plentiful plant Dr Dymock says 'The plant is a native of Sind' This seems highly doubtful

DYE
145 **Dye** — Many writers allude to this as a special dye used in Kashmir to dye silk a delicate yellow colour Throughout the Himalaya it is more or less employed being combined it is said with red colours to soften the tint and with indigo to produce a favourite green (*pista*) Stewart writes

In some of the places where it grows the yellow root is used to aid in dyeing red and Oleghorn states that it is exported from Pangri Lahoul and Kullu to Nadoun and Amritsar to be used in dyeing woollen thread Edgeworth mentions that for this purpose it is combined with *ashirg* (*Delphinium sanctulaefolium* [or rather *D. Zalil* — *Ed*]) In a recent report furnished by the Conservator of Forests North West Provinces it is stated that the dye stuff is exported from the Himalayas to the plains to be used both as a dye and medicine

The parts employed are the yellowish wood bark and root

SPECIAL OPINIONS — § Used extensively as a dye for which purpose it is exported from Kashmir (Surgeon Major F E T Atchison) **Datisca cannabina** (*akilbir*) is found sparsely scattered throughout the forest in upper Kunawur and more plentifully to the west of Wangtu particularly in the Saldung Valley It is known as producing a yellow dye and the roots sell at Amritsar for Rs 14 per maund of 80lb In August the roots are dug up (the bark peeled off) dried in the sun and then packed for export to Rampur or Amritsar About 200 to 300 maunds are obtained annually in Bashahr on the Sutlej It is not known if any be sent from the Rupin or Paber Valleys One root yields from $\frac{1}{2}$ to 1 seer The seed or flowers are of no use as far as is known (G G Minniken Esq Assistant Conservator of Forests Bashahr)

EDICINE
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Medicine — Medicinally it acts as a sedative in rheumatism As a bitter and purgative it is used sometimes in fevers and in gastric and scrofulous complaints In intermittent fevers it is administered in doses of from 5 to 15 grains (*Dymock Mat Med West Ind*, 1st Ed) In the second edition of his work Dr Dymock seems to have modified slightly his statements regarding the drug but adds that in Khagan the bruised

D 146

The Akalbur (G Watt)	DATU
<p>ROOT is applied to the head as a sedative' Balfour says it is used as an expectorant in cattarrh The BARK also contains a bitter principle like quassia</p> <p>Chemistry—The peculiar property of the dye principle of this plant does not seem to have been worked out and results of some interest may be expected from its thorough examination Dr Warden (Professor of Chemistry Calcutta) in reply to an enquiry on this subject furnished the following brief note —</p> <p>It contains a glucoside datiscin which crystallises in colourless needles or laminæ It forms with alkalis a deep yellow solution and according to Bracannot it dyes fabrics both mordanted and unmordanted It forms yellow lakes with lead salts Dr Dymock furnishes a slightly more detailed account He writes The leaves and roots contain a glucoside $C_{21}H_{39}O_{13}$ which may be obtained by exhausting them with alcohol, evaporating to a syrup and precipitating the resin with water from the decanted liquid crystals may be obtained which should be redissolved in alcohol and the remaining traces of resin removed by re precipitation with water Datiscin may then be obtained in colourless silky needles or scales little soluble in cold water and only sparingly so in warm water and ether The crystals are neutral and have a bitter taste they melt at 180 C (Wurts Dict de Chem t I 1134)</p>	<p>MEDICIN Root 147 Bark 148 CHEMISTRY 149</p>
<p>DATURA, Linn Gen Pl, II 901</p> <p>A genus of herbaceous plants containing in all some 10 or 12 species These are widely distributed throughout the tropical and temperate regions both of the Old and the New World They are all regarded as being highly poisonous and from the remotest antiquity have been used both medicinally and criminally It seems probable however that they have been known in Europe comparatively speaking during modern times only By some writers <i>Datura Stramonium</i> is supposed to be the <i>στροχνος μανικος</i> of Theophrastus and Dioscorides This however seems open to doubt as the descriptions of the plant alluded to by these classical authors do not justify such an opinion It is indeed doubtful if even <i>Stramonium</i> was known during the Roman Empire In modern Greek it bears the name <i>ταπουλα</i>, a word clearly derived from the Persian <i>Tatulah</i> The earliest Muhammadan writers on medicine however describe several forms under the name <i>Jous el mathil</i> and the modern Indian name <i>Dhatura</i> and the Persian <i>Tatulah</i> come from the Sanskrit <i>Dhustura</i> while the name given to it in Southern India <i>Ummettak kay</i> comes from the Sanskrit synonym <i>Unmatta</i></p> <p>The Arabic and Sanskrit literatures fully establish an ancient knowledge of the properties of the drug But so much difference of opinion prevails amongst modern writers on the medicinal as well as non medicinal forms that it may not be out of place here to analyse these opinions and to furnish at the same time brief contrastive descriptions that may assist in the separate recognition of the forms met with in India We may thus be able to procure in the future more trustworthy information than we presently possess It is customary for example to read of the white flowered datura and of the purple flowered datura but the colour of the flower is in all probability a matter of accident or of cultivation—it is certainly not specific Writers who speak of the purple-flowered being a more powerful poison than the white, may have originally got their ideas from an ascertained fact namely that a form one of the characters of which was to have flowers of that colour had the poisonous property highly developed But any of the Indian species or varieties may have purplish</p>	<p>150</p>

URA

Colour of the Flowers of *Datura*.

ORY

flowers Indeed *D alba*, a name formerly given to what is now treated as a variety of *D fastuosa*, has often purplish flowers. So again, *D Metel* has generally white flowers but sometimes they are purplish. Either of these species may however have been the white-flowered *datura* of the early writers, and very probably it was *D Metel* that was their less poisonous white-flowered *datura* and not *D alba* as supposed by most modern authors. It thus follows that nothing could be more misleading than to base an opinion as to the merits of a *datura* simply because of its flowers being purple or white. Few plants could generically be more easily recognised than the *daturas*. The long plaited corolla and inflated calyx the latter separating transversely on fertilisation so as to leave a collar around the base of the thorny fruit are unmistakeable characters. And these characters are peculiar to all the forms but cultivation may modify the colour of the flower or even double the flower—one corolla appearing to grow from the interior of the other. How far the chemical properties of the plants are affected by selection or care in cultivation it is impossible to discover. But one thing is certain that the *daturas* have been and are to some extent cultivated and many of the peculiar forms met with in certain localities are most probably escapes from a former cultivation. Indeed, it is scarcely possible to avoid the conviction that cultivation has had far more to say to the peculiarities of the *daturas* than is generally believed. In a great many Indian localities the plant appears at most only semi wild and has all the appearances of being the degenerated offspring of a cultivated stock once upon a time much more generally cared for than at the present day. There are for example numerous forms known to the native expert that would be utterly unrecognisable in the herbarium. Like the forms of *Aconitum Napellus* some of these are poisonous and others comparatively innocuous. The shepherd will dig up and eat one form of *Aconite* but eschew another recognising it as a virulent poison. But to the botanist they are indistinguishable. This same knowledge is prevalent regarding the forms of *datura*. That we should longer remain entirely ignorant of these facts is doubly to be regretted since we are alike unable to check criminal abuse and to take full advantage medically of the meritorious forms.

As sold in the Indian bazars *datura* should be used with the greatest caution. It would richly repay any person having the opportunity and leisure to prosecute such researches to cultivate in India side by side all the forms known to the natives and having critically examined and described these to have them subjected to chemical analysis. It might then be possible to establish some more trustworthy standard by which to differentiate the *daturas* than we possess at present. Such a study might not reveal a more extensive series of varieties and cultivated forms than is supposed to exist but that the specific distinctions recognised by botanists would thereby be broken down seems highly likely. Possibly all the Indian *daturas* constitute but one or at most two species. The differences currently admitted are scarcely more than what in most other genera would be attributed to climatic causes. *Datura Stramonium* might be called the type of the temperate or alpine series, and *D fastuosa* that of the tropical or plains assemblage. Some of the conditions of the former, like some of those of the latter have blueish flowers certain are recognised as virulent poisons others sufficiently less so to be employed neither criminally nor medicinally. *M Naudin* devoted much careful study to the species of *Datura* cultivating all those of which he could procure the seeds. It is recorded that *Dr George Bide OIE* of Madras sent seeds of *D alba* to *Professor Flückiger*, and that these were handed over to *Naudin*. As the result plants *first*, of the true *D alba*, were obtained *second* plants with flowers white inside and violet outside, *third*, plants with double corollas of a large

The Datura Poison.	(G Watt) DATURA
<p>size and yellow colour It is remarkable that these should all be said to have been obtained from the seed of <i>D alba</i>, and it would be instructive to know (if by any chance the observation was made at the time) whether the seeds were collected from one individual plant or from two or more plants. It has to be admitted that the utmost we can say of the Indian daturas is a confession of defective knowledge and an appeal for more critical study. The reader is referred to the remarks below (under each species) for a brief description of the forms commonly recognised. But before passing from this introductory account it may be as well to allude to one or two authors whose writings deserve consideration although it is impossible to decide to what particular species or form they more especially allude. Garcia de Orta visited India in 1534 and became physician to the hospital at Goa. In 1563 he published his <i>Coloquios</i> in which much valuable information is given regarding datura and most other Indian drugs. He describes at pages 83 and 84 the criminal uses of the drug in the hands of servants and highway robbers. Shortly after Huyghen van Linschoten visited India and the Journal of his Voyage (published 1596) gives a most complete account of <i>dhatura</i>—the plant found around Goa—and hence presumably a form of <i>D fastuosa</i>. He writes: They have likewise an hearbe called Deutroa which beareth a seed whereof brusing out the sap they put it into a cup or other vessel and give it to their husbands eyther in meate or drinke and presently therewith the man is as though hee were halfe out of his wits and without feeling or else drunke (doing nothing but) laugh and sometimes it taketh him sleeping (whereby he lieth) like a dead man so that in his presence they may doe what they will and take their pleasure with their friends and the husband never know of it. In which sort he continueth foure and twentie hours long but if they wash his feete with colde water hee presently reviveth and knoweth nothing thereof but thinketh he had slept. Commenting on Linschoten's account of the drug his contemporary Paludanus states that "<i>Deutroa</i> of some called <i>Tacula</i> (a misprint for <i>tatula</i>) of others <i>Datura</i> in Spanish <i>Burla Dora</i> in Dutch <i>Igell Kolban</i> in Malaha <i>Yumata Caya</i> in Canara <i>Datura</i> in Arabic <i>Marana</i> (the Arabian name is <i>Faus masal</i>) in Persian and Turkie <i>Datula</i>. Of the description of his hearbe and fruit you may read in the <i>Herballees</i> if any man receaveth or eatheth but half a dramme of this seed hee is for a time bereaved of his wits and taken with an unmesurable laughter. Linschoten frequently recurs to datura. This hearbe he says groweth in all places in abundance and although it is forbidden to be gathered or once used never the less those that are the principal foridders of it are such as dayly eat thereof &c. It is somewhat remarkable however that while he enlarges at great length on the various criminal uses of the drug he makes no mention of the medicinal.</p> <p>The <i>Makhsan</i> recommends preference to be given to the purple flowered datura and the author adds as his reason that all the parts of the plant are powerfully intoxicating and narcotic. He gives the following account of datura intoxication — Everything the patient looks at appears dark he fancies that he really sees all the absurd impressions of his brain his senses are deranged he talks in a wild disconnected manner tries to walk but is unable cannot sit straight insects and reptiles float before his eyes he tries to seize them and laughs inordinately at his failure. His eyes are bloodshot he sees with difficulty and catches at his clothes and the furniture and walls of the room. In short he has the appearance of a madman." According to Dutt, 'Sanskrit writers do not make any distinction in the properties of the two varieties of datura, and in practice both are indiscriminately used. Sometimes the white flowered</p>	<p>HISTORY</p>

**DATURA
fastuosa****The Black Datura****HISTORY**

variety is specified as for example in a prescription for insanity quoted below *Dhatura* leaves are used in smoking by debauched devotees and others accustomed to the use of *ganja*. The seeds are added to the preparations of *bhāṅg* (leaves of *Cannabis sativa*) used by natives for increasing their intoxicating powers. The use of the powdered seeds in sweetmeats, curry powder &c for the purpose of stupifying travellers and then robbing them is well known. Further on Dutt says of the habit of smoking the leaves as a cure for spasmodic asthma. I have not met with any written prescription for it in Sanskrit or vernacular medical works nor does the *Taleef Shereef* allude to the practice as known to the Mussulman Hakims. It would seem therefore that this use of the drug is of recent origin. Smokers of *ganja* however as is well known suffer from violent fits of a kind of false asthma so that the habit of smoking the leaves by devotees &c to which Dutt alludes is practically a recognition of the property the knowledge of which he excludes the early Sanskrit authors from possessing. In the passage quoted above it may be doubted whether Dutt is narrating his own knowledge of the modern employment of the leaves or is quoting the opinions of Sanskrit writers. The point is of considerable historic interest. Ainslie found that the natives of South India during his time (1820) were unacquainted with the value of the leaves in the cure of asthma and it is commonly stated by writers on the subject that the discovery of this property is due to European medical science.

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Datura fastuosa, Linn Fl Br Ind IV 242, SOLANACEÆ**THE BLACK DATURA****Syn**—*Datura hummatu* Bernh. *Dals* and *Gibs Bomb Fl 174*

Vern—*Kala dhatu* a HIND *Kala dhuturu* BENG *Dhatura* SANTAL *Khunuk* (according to Irvine) BEHAR *Toradana* (Peshawar District) PUSHTU *Dhaturo* (there are two kinds—*acho* white and *karo* black) STOCKS) SIND *Kala dhatura* BOMB *Kala dhatura udah dhatura* DEC *Kala dhaturā* or *kalo dhaturu* GUJ *Karu umattai* (Moodeen Sheriff) *Karu unate karu umatay* (Ainslie) TAM *Nalla ummetta* (Elliot) TEL *Karu ummatta* (Moodeen Sheriff) *rotecubung kechu bung* (Ainslie) MALAY *Pa daing ame padayinkhatie* BURM *Attana* (Trimen) *Kalu attana* and *antenna* (Ainslie) SING *Dhattura dhustura ummatta kala hemika* (Moodeen Sheriff) *krishna dhattura* (Ainslie) SANS *ḡ us massel* (Avicenna states is more correctly *D Metel* but that name is now given to this species) *ḡous masle asvad* *ḡous masame asvad* ARAB *Keihu buh* (according to Ainslie), ARAB in Egypt *Taturake siyah* (Nabrak according to Stocks) *guagiah* (Ainslie) *kais mdsale siyah* *kous kunae siyah* and *Taturake siyah* (Moodeen Sheriff) PERS

References—Rowb *Fl Ind Ed C B C 188* *Nals & Gibs Bomb Fl 174* *Flora Andrica 126* *Mason's Burma 488 798* *Report on the Botany of Mervara by ḡ F Duthie Voyage of John Huygen van Linschoten to the East Indies I 210-211 and II 68* *Garcia de Orta Coloquios pp 63-84* *Ainslie Mat Ind I 442 636; O Shanghnessy Beng Dispens 59* *Moodeen Sheriff Supp Pharm Ind 130; U C Dutt Mat Med Hind 207* *Dymock Mat Med W Ind and Ed 518* *Flick & Hanb Pharmacog 462 U S Dispens 15th Ed 1364* *Bent & Trim Med Pl 192 S Arjun Bomb Drugs 97* *Murray Pl and Drugs Sind 155* *Waring Basar Med, 52* *Irvine Mat Med Patna 27* *Hummatu in Rheede's Hort Mal Baden Powell Pb Pr 297 363* *Atkinson Him Dist 735* *Drury U Pl 188* *Birdwood Bomb Pr 209* *Balfour Cyclop I 897* *Smith Dic 152* *Med Top Ajmir 133* *Mysore and Coorg Gas I 56 63; Gazetteers (Kanara) XV 439 (Gujrat) 11* *Peshawar 26; Orissa II 180, Special Report from the Government of Burma where it is*

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said to occur in Chindwin Valley, Kyaukpadaung Mandalay Upper Burma
Toungoo Ruby Mines and Bhamo districts Special Report from Ben
gal where the plant is said to be often grown in gardens

Habitat—A small shrub found all over the tropical parts of India in waste places There are said to be two if not three recognisable forms of this plant the type being ascertained by the following characters Flowers white or purplish large; corolla often 7 inches long with a spreading mouth which is sometimes 5 inches in diameter teeth 5 or 6 but the flower frequently seen to be double one corolla within another Fruit roundish (not ovate) spinose all over stalk recurving with maturity until the fruit becomes pendent When the seeds are ripe the fruit opens irregularly forming a few short valves

This is very generally reputed to be the most virulent form of the Indian daturas but in few cases indeed do authors distinguish it from the variety *alba* described below so that the statements of medical uses given both in this place and under *D. alba* may fairly well be regarded as dealing jointly with one and the same species As already quoted the *Makhsan* gives preference to the purple-flowered datura (presumably *D. fastuosa*) but according to Dutt the Sanskrit writers do not make any distinction in the properties of the two plants though the white form (*D. alba*) is recommended to be used for insanity Dalzell and Gibson say there are several well known varieties of *D. alba*. They however make no mention of these being used medicinally Of *D. Hummatu* (= *D. fastuosa*) they remark that in Bombay it is almost as common as the preceding They then add These plants are intoxicating and narcotic the root is used in violent headaches and epilepsy poultices are made of the leaves for repelling cutaneous humours the bruised seeds are applied to boils The *Pharmacopœia of India* makes *D. alba* officinal but says of *D. fastuosa* It is generally thought to be the more powerful of the two but there is no evidence of this being the case The probability is that they possess equal powers as a narcotic and anodyne but clinical observation is wanting to confirm this It is only necessary to say in order to confirm this confession of ignorance that while the active principle of *D. Stramonium* has been isolated and its properties determined neither *D. alba* nor *D. fastuosa* have as yet been critically examined and it is therefore practically by a comparison only with the therapeutic actions of these and of *D. Stramonium* that we are enabled to infer that they contain the alkaloid *Daturine*

But it may be added that *D. fastuosa* is so universally believed to be stronger than *D. alba* or *D. Metel* that it is preferentially used by the criminal classes

Criminal Purposes—Considered by some of the native doctors a better variety than the white the *Pharmacopœia of India* affirms that there is no foundation for this opinion The seeds constitute a favourite poison for criminal purposes These seeds or a preparation from them are generally employed by the Indian road side poisoners not for the purpose of destroying life but simply to stupefy their victims with the view of easy committal of theft Death may follow as a consequence of over dose (*See Chevers Jurisprudence*) The seeds are also in Bengal employed to render liquor more intoxicating and for this purpose they are burned upon charcoal the vessels being inverted to catch the smoke The seeds may also be used in the form of a powder for the same purpose when a stronger intoxicant is desired When the vessels are full of smoke the liquor is thrown into them and the mouth covered over for a night It seems remarkable that when thus burned the smoke should retain its poisonous and intoxicating properties Dr Dymock states that in

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Bombay the smoke from the seeds burned over charcoal is also used to make liquor intoxicating Mr H Sewell Collector of Cuddapah reports

This is known as *Umatat* in Tamil There are two species—white and black Both grow wild and are not cultivated The former is not used for any purpose For mixing with intoxicating beverages for instance toddy the latter is useful Its seeds are soaked in that liquor along with a quantity of poppy seeds ground to a paste The mixture is then strained and mixed with fresh drawn toddy which gives the latter in intoxicating power It is not possible to estimate the quantity of datura seed consumed in this way Mr Baden Powell (*Pb Prod I 297*) alludes to a series of samples shown in the Lahore Museum as illustrative of the criminal methods of using the drug in Upper India He says (quoting from a report on these written in 1863) The series consists of the seeds of the plant in their raw state seeds roasted essence of the seeds atta (flour) drugged with the poison sugar ditto and tobacco ditto He then remarks this is the agent used by the Thugs to stupefy their victims Both kinds of the datura the white and the purple are used but the white (*sic*) is considered the most efficient For poisoning purposes the seeds are parched and reduced to a fine powder thus it is easily mixed with sugar atta tobacco &c Also the professionals distil the seeds with water forming a powerful essence ten drops of this is sufficient if put into a *chillam* of the *huka* to render a man insensible for two days The taste is acrid and bitter and soon followed by a burning suffocating sensation It is very difficult to detect in a *post mortem* examination The victims are usually discovered in a state of insensibility and breathing hard and heavily if removed care should be taken not to expose them to the heat of the sun which is fatal The action of the poison is quicker in the hot weather than in the cold much of course depends on the individual constitution of the victim but usually in hot weather it begins to work in five minutes coma supervening within the hour In cold weather it begins to act in a quarter of an hour or twenty minutes

Medicine—For Medical uses proper see under *var alba*

SPECIAL MEDICAL OPINIONS RECORDED UNDER D fastuosa §— The form of datura with blue flowers is considered stronger than the white kind No doubt this drug prevents hydrophobia There are persons here and there in this district who are considered professors in curing hydrophobia But none of them will reveal the secret of the medicine used With great pains and labour I discovered this remedy I have myself treated many cases successfully and some of my pupils have been equally successful My treatment consists in giving the medicine previous to the time of the development of hydrophobia

It is usually found that hydrophobia comes forty days after the patient has been bitten by the mad dog (except some rare cases which I have known to happen within two or three weeks) My treatment is to give the following medicine two weeks after the patient has been bitten *sic* between the fifteenth and twenty fifth days In the morning after the fifteenth day of the bite about six o'clock give a dessert spoonful of tea wood-charcoal powder (This seems to be given lest the poison of the juice overcomes the patient) Half an hour after give an ounce of the JUICE of the black datura leaves Soon after follow with Palmyra jaggery or something else in order to check vomiting Then bind the person lest he does mischief to others, and keep him in the sun for four or five hours until midday Then the person gradually becomes mad and does many things like the mad dog (when these symptoms appear it is evident that the patient had been really bitten by a mad dog, and that he will totally recover) In the afternoon pour many pots of cold water over the head This causes

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great annoyance to the patient and he resents it to the utmost protesting loudly Food should now be given such as pork salt fish brinjal horsegram Bengal gram &c &c The patient may be considered out of danger and should receive simple light diet		MEDIC
If you were to treat a person already suffering from hydrophobia then you must scratch the front part of his head with a lancet so as to make it bleed a little and rub in the ground LEAVES of the black datura as well as give the juice internally (<i>V Ummegudien Mattapollisan Madras</i>)		Leavi 154
The above has been given as a sample of many similar violent remedies the writer has received from native practitioners in all of which datura is recommended in the cure of supposed mad dog bites The English of the original has been slightly altered and superfluous matter removed but the principle and method of treatment has been faithfully preserved [<i>Ed Dictionary Economic Products</i>]		
I have used this drug pretty extensively In painful swellings I apply the JUICE of fresh leaves or make a poultice of them The fresh juice in ophthalmic pain I find very useful it checks the inflammation if there be any Inhalation of the smoke of the burning DRY LEAVES and TWIGS is always useful in asthmatic fits Smoking the powdered dry leaves and twigs relieves the spasm but when smoked in excess brings on giddiness and fainting The seeds are said to be useful in cases of hydrophobia and the anther in cholera (<i>Civil Surgeon D Basu Faridpur Bengal</i>) The dried root of the plant I have frequently used as smoking to relieve fits of asthma" (<i>Nundo Lall Ghose Bankipur</i>) 'In ear ache the fresh juice of the leaves is useful a drop or two poured inside the ear (<i>Assistant Surgeon T N Ghose Meerut</i>) 'The dried leaves are smoked in cases of asthma The expressed juice of the leaves is used as an external application to relieve the pains of gout and rheumatism and in cases of glandular inflammation and enlargement The leaves are also employed as poultices to check inflammation of the breast and excessive secretion of milk in cases where an abscess is threatened' (<i>Civil Surgeon F H Thornton BA M.B Monghyr</i>) When in Jessore, about five years ago in two separate instances a batch of men were sent to me by the police all with well marked symptoms of dhatura poisoning and some proved fatal (<i>Civil Surgeon G Price, Shahabad</i>) The leaves constitute an anodyne poultice The SEEDS are mostly used in medicine They are believed to be aphrodisiac and are also employed for cough diarrhoea asthma intermittent fevers (<i>Surgeon Major Robb Civil Surgeon Ahmedabad</i>) Smoking of leaves is a useful antispasmodic in asthma and chronic bronchitis I found the juice of fresh leaves efficacious when applied over painful glandular swellings (<i>Assistant Surgeon Shib Chandra Bhattacharya Chanda Central Provinces</i>) Dry root of the above in about half grain doses is given by the Hakims of the N W Provinces to take with betel leaves in syphilitic diseases The seeds are also employed by them for impotence in the following way Seeds of 15 fruits dried and pounded are well boiled in ten seers of cow s milk out of this milk as much ghee as possible is made, this ghee is believed to contain strong aphrodisiac properties and is rubbed on the genitals twice a day to stimulate them and about four grains of the ghee is also given internally once a day (<i>Assistant Surgeon Nobin Chunder Dutt, Dhurbhanga</i>) "In Mysore the juice of the leaves is given once daily with curdled milk for gonorrhoea" (<i>Surgeon Major John North I M S, Bangalore</i>) 'Have used the leaves warmed over a fire nightly as an external anæsthetic in rheumatism' (<i>Dr Picachy Civil Medical Officer Purneah</i>) The leaves are useful as a local application in rheumatism The concentrated juice of the leaves is prescribed in mumps as a		Julc 154 Dry Le 154 Twli 15 Roc 154 Seed 154

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astuosa****MEDICINE****The White Datura.**

local application and has a marked effect in reducing the swelling and tenderness (*Narain Misser Kathe Basar Dispensary Hoshangabad Central Provinces*) An extract made from the seeds is a good mydriatic and the leaves are used as emollient and suppurative (*Honorary Surgeon Easton Alfred Morris in Medical charge Tranquebar*) The leaves of this plant are boiled made into a poultice and applied locally to boils and abscesses to relieve pain and hasten suppuration (*Surgeon W F Thomas Mangalore*) A few seeds with *ugargarha* (*Anacyclus Pyrethrum*) root and cloves are chewed as an aphrodisiac (*Dr Emerson*) A paste composed of datura and turmeric is useful in checking inflammation of the breasts (*Civil Surgeon F Anderson M B Bijnor*) The juice of the leave is a good substitute for Belladonna (*Surgeon Major P N Mookerjee Cuttack Orissa*)

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Var *alba*, *Nees Fl Br Ind, IV, 243***WHITE DATURA****Syn** — *D ALBA Nees*

Vern — *Saféd-dhatura sidah dhatura* HIND *Dhutura* BENG *Dather* KASHMIR *Dhotaru* MAR *Ujla dhaturah* DEC *Dho o dhaturu* GUJ *Umatat* TAM *Ummetta dutturamu* TEL *Ummatto gida* KAN *Ummatta ummam* MALAY *Padayin phisu* BURM *Sudu attana* SING *Ummatta vrikshaha* SANS *Jous masal* or *Jous masle* abyas ARAB *Kous masale saféd talwrahe saféd* PERS

NOTE — It is doubtful how far the vernacular names given by authors for *D fastuosa* and *D alba* can be regarded as specific since either forms may have white or blue flowers Indeed these plants have more generic than specific names the simple equivalents of *Datura* of the plains as the names given by the hill tribes are but further synonyms though given to the form met with in the higher regions **vis D Stramonium**

References — *Flora Andhruta* 48 186 *Mason's Burma* 488 798 *Pharm Ind* 175 460, *Ainslie Mat Ind* 1 442 *O'Shaughnessy Beng Dispens* 409 *Moodeen Sheriff Supp Pharm Ind* 130; *U C Dutt Mat Med Hind* 207 *Dymock Mat Med W Ind 2nd Ed* 518 *S Arjun Bomb Drugs* 96 *Murray Pl and Drugs Sind* 155 *Year Book Pharm* 1880 250, *Baden Powell Pb Pr* 363 *Atkinson Him Dist* 735 *Drury U Pl* 188 *Lisboa U Pl Bomb* 268 *Bomb Gas V* 27 *Balfour Cyclop* 1 897 *Home Dept Cor regarding Pharm Ind* 222 230 321 *Madras Man Admin* 11 65 *Man Cuddapah* 200 *Orissa Gas* 11 180 *Gas Mysore and Coorg* 1 56 *Gas N W P (Meerut)* 11 506 111 81

Habitat — A large spreading annual two to four feet high found like the type form of the species throughout the warmer parts of India though it only rarely ascends above 3 000 feet This form doubtfully deserves the rank of a variety The characters of the flower and fruit are almost identical with that already given except that they are smaller the teeth of the calyx being less than half the size of those in *D fastuosa*, and almost lanceolate-acuminate instead of ovate-acuminate Flowers white or slightly bluish outside If anything this is even more abundant and fortunately so for it is very generally reputed to be less virulent than the black *dhatura*

Medicine — The properties of the Indian plains *Datura* are supposed to be practically identical with those of *D Stramonium* and analogous to those of Belladonna The officinal parts are the SEEDS and the LEAVES of the former a tincture an extract and a plaster are prepared and of the latter a poultice but the dried leaves are also smoked to relieve urgent symptoms in spasmodic asthma the dyspnoea of phthisis emphysema of the lungs or even in chronic catarrh The tincture and extract are sedative and narcotic, the former preparation by many writers is recommended as a useful and cheap substitute for opium 20 drops of the

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tincture being equal to a grain of opium The latter has been frequently employed as a convenient substitute for extract of Belladonna the dose being a quarter of a grain increased gradually to a grain and a half thrice daily Dr Bidie suggests an extract from the leaves and in the *Pharmacopæia* this preparation is well spoken of ' In a case of phthisis, in which it was employed in two-grain doses it acted favourably on the dyspnœa and produced much the same effect as extract of Belladonna in doses of a third of a grain Dr Bidie considers that the larger dose in which it can be administered is an advantage The plaster and the poultice are effectual local anodynes in case of nodes rheumatic enlargements of the joints painful tumours or external piles The plaster is frequently used on the chest in asthma and chronic pulmonary affections but neither should be applied to ulcerated surfaces owing to the risk of absorption of the poison Amongst native women a poultice of *datura* leaves is a favourite method of arresting the secretion of milk in cases of painful breasts The active principle *daturine* in place of atropia has been proposed for ophthalmic purposes but with comparatively little success The effect of the administration of *datura* is to produce dilatation of the pupil should it become very large and dilated this may be taken as a sign that the medicine has been carried as far as it can with safety whether it has produced its other intended effects or not' (*Waring Baz Med* 53)

Waring recommends it to be tried in tetanus (lock jaw consequent on a wound) when other better remedies are not procurable A poultice of the leaves renewed three or four times a day should be kept constantly to the wound which should be further cleansed if covered with thick discharge or slough by the process of irrigation of tepid water The tincture of *datura* doses of 20 to 30 drops in water may also be given internally three or four times a day The dose must be regulated by the effect produced but it may be continued (unless the spasms previously yield) till it produces full dilatation of the pupil with some degree of giddiness drowsiness or confusion of ideas beyond which it is not safe to carry the medicine If the spasms abate *i.e.* if they recur at more distant intervals and are less severe and prolonged when they do occur the medicine in smaller doses at longer intervals may be continued till the spasms cease altogether but if under the use of the remedy after it has produced its specific effects on the system the spasms show no sign of abatement no good but perhaps harm will result from continuing it In addition to the above means *datura* liniment should be well rubbed in along the spine several times daily The patient should be confined to a dark room and protected from cold draughts of air the bowels should be opened if necessary by turpentine enemas The strength should be supported by strong beef tea or mutton broth by eggs beaten up with milk and by brandy or other stimulants (*Bazar Medicines* 56)

The above may be viewed as a brief abstract of the current European medical uses of *datura* but by the natives of India the drug is highly spoken of in the treatment of insanity and of the painful headaches which often precede epilepsy and mania and Ainslie mentions that Muhammadan doctors especially prescribe for these purposes a powder of the root in very small doses not exceeding a quarter of a grain increased to three grains Ainslie adds that Berguis and Stoerck ordered the inspissated juice of the leaves of *D Stramonium* in epilepsy Indeed the modern use of *datura* may be said to date from Baron Stoerck's success with it in the treatment of mania and epilepsy Though still occasionally employed for these diseases its use might be said to be almost confined to neuralgic and rheumatic affections, dysmenorrhœa, syphilitic pains, cancerous sores, and

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spasmodic asthma but most of all for the last complaint Waring affirms that in some few cases it is not serviceable in asthma but so frequently is it of great benefit that patients subject to chronic asthma should always keep a pipe filled and ready to light Dymock remarks that Sanskrit writers describe the plant as beneficial in mental derangements fever with catarrhal and cerebral complications diarrhoea skin diseases depending upon the presence of animal parasites painful tumours inflammation of the breasts &c A pill made of the pounded seeds is placed in decayed teeth to relieve toothache and the leaves are smoked along with tobacco in asthma According to Dutt no mention of the latter use of the plant is to be found in old Hindu books Muhammadan writers also are silent upon this point Ainslie found upon enquiry that the physicians of Southern India were unacquainted with the value of datura in spasmodic asthma but he tells us that his friend Dr Sherwood of Chittore noticed the smoking of *D fastuosa* as a remedy in that disease In the Konkan the juice of *D alba* is given with fresh curds in intermittent fever to the extent of one tola during the intermission and at least two hours before the fever is expected Ainslie (p 637) mentions a case in which great relief was obtained in sciatica from an extract administered in one-eighth of a grain to grain doses Drury states that a preparation of the leaves in oil is used in the cure of itch and rheumatic pains by being rubbed on to the part affected In Sind it is said that a poultice of the bruised leaves and rice flour is believed to relieve the pain and hasten the expulsion of guinea worm The leaves of the white variety are sometimes chewed with the same object (Murray) In Rajputana mothers smear their breasts with the juice of the leaves to poison their new born female children (Drury) Mr H Z Darrah Director of Land Records and Agriculture Assam has furnished the following information regarding the daturas of the Assam Valley The Assamese *dhutara* is probably the *D Stramonium* —[This is most unlikely since we have no knowledge of that species existing so far to the east it is more than probable that one or two forms of *D fastuosa* or possibly also *D Metel* constitute the *dhutara* of Assam—Ed] ‘The white flower the purple flowering and also the yellowish tinged variety, are met with growing wild in villages and waste places A few plants are specially protected for medicinal use It is known as a strong poison and to cause delirium The dried leaves are rarely smoked and then only as a remedy in illness, but the leaves are used as a paste and applied the seeds are taken internally with other articles as a medicine and sometimes the root is used It is not used as an intoxicant It is said according to a popular idea to be put as an ingredient into a medicine used to prevent hydrophobia after the bite of a mad dog but is given carefully and in sufficient quantity only to produce delirium or madness, which is thought to take the place of the madness of the hydrophobia It is said to be ineffectual when hydrophobia has begun” Mr Sewell Collector of Cuddapah Madras, writes that two forms grow wild in his district—the white and the black the former is not used for any purpose but the latter is employed for making toddy intoxicating ‘The leaf is smoked along with tobacco by asthmatic patients’ Mr H Whilock Collector of Trichinopoly while stating that one or two forms grow in back yards and gardens’ adds it is never smoked”

SPECIAL MEDICAL OPINIONS COMMUNICATED REGARDING *D alba*—

The juice of the leaves I have frequently used to dilate the pupils with success’ (Nundo Lal Ghose Bankipur) The leaves are employed as an external application in rheumatism the joint being enveloped in the leaves of the castor oil plant afterwards (Lal Mahomed Hospital Assistant Main Dispensary Hoshangabad Central Provinces) ‘I have

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used a pulp of the leaves made with water as an application in sweating of the feet with success (Civil Surgeon L Cameron M D Nuddea)

The juice of the leaves is used as an antiperiodic in intermittent fevers' (Surgeon Major D R Thomson M D, C I E Surgeon, 1st District Madras)

MED

Datura Metel, Linn Fl Br Ind IV, 243

The origin of the name Stramonium is obscure but it appears to have been first given to this species—a plant which as a matter of history is known to have been cultivated at Venice under that name about the middle of the sixteenth century **D Stramonium** reached Europe some short time after and taking more kindly to its new home spread rapidly and in time came to bear the name Stramonium, which botanists have given to it as its classical specific designation Another curious fact is vouched for by Avicenna namely that originally **D Metel** was the *Massel* or *Mathil* of Arabic writers although by modern usage that classical name has been assigned to **D fastuosa** Of **D Metel** the *Flora of British India* affirms that the flowers are whitish purple but Ainslie states that **D fastuosa** is the **D rubra** of Rumphius and is distinguished from **D Metel** by having dark coloured flowers while those of **D Metel** are white He then proceeds to further distinguish these species by their foliage—**D fastuosa** having the leaves ovate angular while **D Metel** has cordate almost entire leaves and is pubescent He adds that **D Metel**, according to Forskahl (*Flora Arabiæ Felicis*) has three Arabic names and that it is the **D alba** of Rumphius and the *Humatu* of Rheede Dealing apparently with Rheede's *Humatu* the *Flora of British India* refers it to **D fastuosa**, and a doubtful variety of that species based on Rheede's drawing in which the fruit is shown as smooth instead of spinescent On the other hand Roxburgh's **D Metel**, which he states to be Rheede's *Hummatu* (*Hort Mal II 47 t 28*) is reduced both by Dunal (*DC Prod XIII Pt I 542*) and the *Flora of British India* to the variety **D alba**, described above It would thus seem that a considerable amount of difference of opinion prevails amongst botanists and it is therefore not to be wondered at that writers on the medical properties of these plants should have got confused as to the 'white datura' The name *Metel* would indicate that the plant first so named came to Europe through the Arabs and *Humatu* is doubtless a mistake for *Unmatta* or *Ummatta* the Sanskrit and South Indian name for any datura It is to be regretted therefore that such names should have been adopted in botanical literature as the classic names of species to which they only very doubt fully belong

Vern — There are no specific vernacular names intended in India to denote this species. All the names given above might be applied to it but more especially those recorded under **D alba** Indeed the writer strongly suspects that the white dhuturá of the early Sanskrit and Arabic writers was **D Metel**, as now known to botanists and not the variety of **D fastuosa** known as *alba* This suggestion seems at least worthy of being tested chemically and if **D Metel** should be found to contain less of the poisonous principle than **D fastuosa**, it might be held as partly confirmed The most trustworthy modern writers hold that there is no difference between **D fastuosa** and **D alba**, whereas for centuries the purple datura has been held to be much more poisonous than the white

References — *Mason's Burma* 488 708 *Ainslie Mat Ind I 443*
U C Dutt Mat Med Hind 297 *Birdwood Bomb Pr 60 309*
Smith Dic 152 *Mysore Cat Cal Exh 21* *Fleming, Med Pl and Drugs in As Res Vol XI 165*

DATURA
ramonium

Stramonium or Thorn Apple

Habitat.—A herbaceous plant found in the Western Himálaya and mountains of the West Deccan Peninsula probably introduced into India Fleming (*As Res*) in the passage quoted below affirms that this is a native of the Himálavas and is the species met with in Kashmír It is widely naturalised in the Old World and produces flowers and seeds the whole year

This is a much more temperate species than the preceding but in shape of flower and character of fruit can with difficulty be distinguished The corolla possesses however 10 instead of 5 teeth or petals the leaves are pubescent and show a pronounced tendency to be cordate at the base The stems are almost sub-villose a character by which the plant may be recognised in the bazar product from all the other Indian daturas It is a much smaller species than any of the others its pubescence and 10-petalled corolla being its characteristic features

Medicine—Sir George Birdwood mentions this plant in his list of drugs of Bombay as if it were *the datura* It possesses properties similar to those of the other species Fleming (*As Res XI 1840*) gives it the names of *D hatura* HIND and *D hustura* SANS and refers to *Murray I 670* and *Woodville II 338* works which the writer has not the opportunity of consulting In a further passage (quoted in full under **D Stramonium**) Fleming holds that this is a native of India and seems to concur with Linnæus that it might be used in preference to **Stramonium**

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Datura Stramonium, Linn Fl Br Ind, IV, 242

STRAMONIUM OR THORN APPLE

Syn—**DATURA FEROX** Nees (the plant described by Madden as the *Kála dhatura* of Kumaon Atkinson *Him Dist p 370*) D WAL LICHII Dunal STRAMONIUM VULGATUM Gärtn

Vern—By many writers this bears the same popular names as have already been given under **D fastuosa var alba** and if the suggestion that **D Metel** is the white *datura* proves incorrect this is much more likely to be the plant meant than the **D alba** of Botanists *Sada dhuturá* BENG Taitur *dattura* PB *Kachola datura* ARG *Umatai* TAM *Ummetta* TEL *Datturi gida* KAN

References—Stewart Pb Pl 156 O'Shaughnessy Beng Dispens 59 Balfour Cyclop I, 897 Smith Dic 152 Kew Off Guide to the Mus of Ec Bot 100 Fleming Med Pl and Drugs in As Res Vol XI 165

Habitat—The temperate Himálaya from Baluchistan and Kashmír to Sikkim It is distributed east and west along the outer Himálayas and thus covers a region of over 1000 miles Taking the neighbourhood of Simla as fairly representative of that area it is very abundant around Simla and is met with everywhere on the march north to Upper Kulu (a distance across the outer ranges of perhaps 150 miles) but everywhere it frequents road-sides and village sites and but rarely is seen in the forests or on the wild uncultivated hills In the deep valley of the Sutlej it is particularly plentiful miles of country as at Rampur being literally covered with *Cassia Sophora*, *Cannabis sativa*, and *Datura* It is often however difficult to say in these lower warm valleys, whether **D fastuosa** or **D Stramonium**, is the species present, since one plant may be found with the erect and the next with the nodding fruit On the higher slopes no doubt need be entertained as the plant there met with has the characteristic ovate erect fruit bursting regularly into four valves for half of the entire length of the capsule Although thus very abundant on the Himálayas, **Stramonium**, like the daturas

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of the plains of India exists in an isolated or disconnected manner from the surrounding vegetation, or forms compact formidable clumps to the exclusion or extermination of all other plants attitudes which to the writer are suggestive of aggressive invasion and conquest Dr Aitchison mentions *D Stramonium* as met with in Afghanistan but doubts its being indigenous and Mr J H Lace has kindly furnished the author with a specimen from Quetta which he remarks is plentiful in or about cultivation up to a height of 7000 feet *D Stramonium* is peculiarly the Himálayan representative of the genus from 3000 up to 9000 feet The *Flora of British Ind* regards it as indigenous to India but M Alphonse de Candolle (*Geographie Botanique II 1855 p 731*) comes to the conclusion that *D Stramonium* L appears to be indigenous to the Old World probably the borders of the Caspian Sea or adjacent regions but is certainly not a native of India that it is very doubtful if it existed in Europe in the time of the ancient Roman Empire but that it appears to have spread itself between that period and the discovery of America At the same time he holds that *D Tatula* (a form most writers express the strongest hesitation in accepting as specifically distinct from *D Stramonium*) is a native of Central America If the account of the peculiar attitude here given of *D Stramonium* be accepted as supporting M. de Candolle's emphatic statement that it is not a native of the Himalayas then must the further opinion be held that all the species of *datura* met with in India are introduced and acclimatised plants

The botanical characters by which *D Stramonium* may be recognised have been partly indicated above but it may be as well to repeat these more fully It is a more compact plant than *D fastuosa* more succulent and of a considerably paler green than the plant of the plains The flowers are also much smaller being only 1 to 3 inches in diameter but the fruit is longer being ovate and *sitting permanently erect in the bifurcations of the stem* instead of recurving on maturity It also bursts open regularly forming four valves which split for half or the entire length of the capsule Except in the variety described below (*Tatula*), the flowers are always white but the most important characters are those given above for the fruit which should be compared with the description of the fruit of *D fastuosa* (see page 33)

Towards the close of the sixteenth century *D Stramonium* was cultivated in England by Gerard who received the seed from Constantinople In his *Herbal* he calls it 'The Thorny Apple of Peru' and says it is a drowsy and numbing plant with properties resembling the Mandrake (*Atropa Mandragora*), a plant which gets its name from Atropos the eldest of the all powerful Parcae the arbiters of life and death

Medicine—It seems probable that on the Himálaya *D Stramonium* is used for all the purposes indicated under *D fastuosa* and *D alba* Stewart says "The SEEDS are used in poisoning and are given medicinally in asthmatic complaints being sometimes smoked with tobacco thus and for vicious indulgence The LEAVES are applied to boils and ulcers and are also smoked with tobacco for asthma Mr Baden Powell states that in the Panjáb (here he probably means the plains and hence *D fastuosa* and not *D Stramonium* would be indicated) the drug has its medicinal uses and its value as a curative in asthma is known both to Europeans and Natives who smoke the seed in their *hukas* when so afflicted

Fleming (*As Res XI 1840, p 166*) says The *D Stramonium*, *Linn*, which is the species used in medicine in Europe is not found in

MEDIC

See

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Leaf

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DATURA
Stramonium**Stramonium or Thorn Apple****MEDICINE**

Hindustan * but the **D Metel** grows wild in every part of the country. The soporiferous and intoxicating qualities of the seeds are well known to the inhabitants and it appears from the records of the native Courts of Justice that these seeds are still employed for the same licentious and wicked purposes as they were formerly in the time of **Acosta** and **Rumphius** (See *Rumph Amb V 242*). I do not know that either the seeds or the extract prepared from the expressed **JUICE** of the plant are used in medicine here but those who place any faith in the accounts given by **Baron Störck** and **Mr Odhelius** (*vide Murray and Woodville*) of the efficacy of the extract of the **Stramonium** in the cure of mania epilepsy and other convulsive disorders may reasonably expect the same effects from the extract of **Metel**, the narcotic power in the two species being perfectly alike. **Linnaeus** indeed has given a place in his *Materia Medica* to the **Metel** in preference to the **Stramonium**.

Juice
169

Fruit
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SPECIAL OPINIONS REGARDING Datura Stramonium § — I have used the **FRUIT** as a poultice and anodyne in whitlow (*Dr Picachy Civil Medical Officer Purneah*). A good anodyne application is made by preparing a warm infusion of the leaves and this is effective in inflammatory pains the crude juice of the leaves mixed with opium and rock salt makes a good local anodyne preparation when applied hot in rheumatism (*Surgeon Edward S Brander M B FRCSE IM D Rungpore*). The leaves made into cigarettes are smoked to relieve asthma. The smoke is inhaled into the lungs (*E G Russell Superintendent Asylums at Presidency General Hospital Calcutta*).

For the European uses of the drug the reader is referred to works on *Materia Medica*.

CHEMISTRY
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Chemistry — It has been stated that it is presumed that chemically the Indian forms of **datura** differ among themselves and from **Stramonium** more in degree than in quality. The active principle is the alkaloid **daturine** a substance practically identical with **atropine**. The experiments of **Schroff** however would indicate that **atropine** has twice the poisonous energy of **daturine** although the two alkaloids agree in composition possess the same qualities in regard to solubility and fusing point and have the same crystalline form. The identity of **daturine** with **atropine** has been maintained by several chemists while the admission of the greater poisonous property of the latter is opposed to such an opinion. **Ladenburg** states that **D Stramonium** contains two alkaloids which he designates as heavy and light **daturine**. **Pochl** affirms that solutions of **daturine** are levogyrate while those of **atropine** exhibit no rotatory power. It is probable that the light **daturine** if isolated would bear a much closer approximation to **atropine** than the mixture of the two.

The leaves contain the alkaloid in a much smaller proportion than the seeds and even the latter possess only $\frac{1}{10}$ th per cent. In the seeds it is said to be combined with malic acid. According to **Joubert** **datura** for ophthalmic purposes is more powerful and lasting than **atropia**.

§ **Dr Warden** (Professor of Chemistry Calcutta) has kindly furnished the following note regarding the chemistry of **datura** — The alkaloids **atropia** and **datura** contained respectively in **Atropa Belladonna** and **Datura Stramonium**, are either identical or agree very closely in chemical

* In the *Asiatic Researches VI 351* Colonel **Hardwicke** enumerates the **Datura Stramonium** among the plants which he found in the *Srinagar* country but he afterwards ascertained that the plant which he met with was the **Datura Metel** and has candidly authorised me to notice the mistake (*Foot note by Dr Fleming*).

Products of India

Gharbhuli or Tatula Apples, Carrot (G Watt)			DA Ca
composition Both widely dilate the pupil when applied locally to the eye or introduced into the system 100 parts of the different portions of the plant in the dried state yielded to Gunther the following results —			CHEN
<i>Datura Stramonium</i>		<i>Atropa Belladonna</i>	
Seed	318 to 365	Leaves	833
Stalks	063	Stalks	146
Leaves	169 to 307	Fruit ripe	813
Root	065	unripe	955
		Seed	407
		Root	810

Var Tatula, Willd Fl Br Ind IV 242 flowers purple

The young fruits strung on threads and imported into India from Persia seem to be those of this variety It is said to be common every where around villages in Afghanistan The name by which these young fruits are sold is *gharbhuli* in Bombay and *maratia mughu* in Madras (*Ainslie Mat Ind II 185*) They are regarded as sedative and slightly intoxicating The writer is by no means sure that he has been able to identify this form but from the descriptions published by botanical authors it cannot be regarded as more than a darker coloured state of the *D Stramonium* commonly met with The name given to it—*Tatula*—is the Turkish corruption of *dhatura* through the Persian the Sanskrit being *dhattura* or *dhustura* it would be equally applicable to any form of *datura* Further it cannot be affirmed that the identification of the Persian article *gharbhuli* with the Madras *maratia mughu* is anything more than a suggestion still less can it be held that these have been satisfactorily determined to be the young fruits of *D Stramonium* var *Tatula* (*Conf* with *Moodeen Sheriff Supp Pharm Ind 131*) O Shaughnessy says — It is a native of North America very nearly the same as *D Stramonium* but is a larger plant with purple stems and the corolla similarly stained at the edges But in this opinion he was most probably in error the plant he regarded as *D Tatula* being more likely a cultivated state of *D Metel* M DeCandolle appears however to consider *D Tatula* to be of Central American origin and if that be so its Turkish name would be a most misleading accident and its identity with the Persian *gharbhuli* highly problematic

SPECIAL OPINIONS — § Enters into aphrodisiac preparations (*T Ruthnam Moodelliar Native Surgeon Chingleput Madras Presidency*)

Sometimes produces almost magical effects in asthma and in paroxysmal neuralgias even when *D Stramonium* has failed (*E G Russell Superintendent Asylums at Presidency General Hospital Calcutta*)

DAUCUS, Linn Gen Pl, I, 928

Daucus Carota, Linn, Fl Br Ind, II, 718 UMBELLIFERÆ

THE CARROT Eng, CAROTTE Fr, GEMEINE MOHRE, GELBE RÜBE, Germ, CAROTA It, LANAHORIA, Sp, MORKOV, Rus

Vern — Gajar gajar HIND Gajar BENG Mor máj bul muj kách KASHMIR Gajar PB Zardak AFG Pítálgugar (Stocks says that gajar alone is the sweet potato) SIND Gásara MAR Gajar Guz; Gájara helangu, manjal mullangi kárttu kishangu TAM Gajjara gedda pita kanda pach cha mullangi shikha mulamu TEL Gajjari KAN; Garjara shikha mulam SANS., Gasar ARAB Zardak gasar PERS

NOTE — The *Talif Seriff* gives *Seals* as the name for the Carrot The *Ain i Akbari* describes a creeper having a long edible conical root under the name *Sádli* and *Brandis* gives *Sádli* as the Panjábi for *Pueraria tuberosa* Dr Dymock informs the writer that *Shaqáqul* (translated wild carrot in the *Ain i Akbari*) is *Trachydium Lehmanni*, *Benth et Hook f* Dr Aitchison, in his report on the Botany of the

Afghán Delimitation Commission calls that plant *Shakk ukhal* and says it is a very common annual in the loamy soil of the Badghis, the roots of which are collected and exported to India *via* Herat. The *Shaqdūl* of the *Ain-i Akbari* was a vegetable apparently regularly eaten in the time of the Emperor and *Trachydium* is certainly not so in India at the present day.

References—*Roxb. Fl. Ind. Ed. C. B. C.*, 270 *Dals & Gibs, Bomb. Fl. Suppl.*, 41 *Stewart Pb. Pl.* 105 *Aitchison Cat. Pb. and Sind. Pl.* 68 *Flora Andhrica* 57 *Stocks account of Sind. Darwān Animals & Plants under Domestication* I 326 II 31 33 113 277 311 *Ainslie Mat. Ind.* I 56 *O. Shaughnessy Beng. Dispens.* 368 *Moodeen Sheriff Suppl. Pharm. Ind.* 131 *U. C. Dutt Mat. Med. Hind.* 208 *Dymock Mat. Med. W. Ind.* 380 *U. S. Dispens.* 15th Ed. 1598 *Bent & Trim Med. Pl.* II 135 *S. Arjun Bomb. Drugs* 64 *Murray Pl. and Drugs, Sind.* 200 *Mueller Sel. Ex. trop. Pl.* 104 *Johnston's Chem. Com. Life* 60 86 158 *Johnston How Crops Grow* 155 156 *Anderson Agri. Chemistry* 286 *Baden Powell Pb. Pr.* 351 *Atkinson Him. Dist.* 355 703 735 *Lisboa U. Pl. Bomb.* 161 *Birdwood Bomb. Pr.* 161 *Royle Ill. Him. Bot.* 228 9 231 *Atkinson Economic Products Pt. V* 13 18 *Bomb. Gaz. V.* 26 *VII* 40 *Folkard Plant. Lore* 270; *Firminger Man. Ind. Gard.* 93 100 101 168 *Spons. Encyclop.* 1432 *Balfour Cyclop.* 590 808 *Smith Dic.* 94 *Treasury of Bot.* 386 *Morton Cyclop. Agri.* 407 632 *Kew Off. Guide to the Mus. of Ec. Bot.* 77 *Fleming, Med. Pl. and Drugs in As. Res.* Vol. XI 166; *Your Agri. Hort. Soc.* 1875 78 Vol. V 39 1871 74 Vol. IV 14 *Report Saharunpore Bot. Gardens* 1884 6, *Report Lucknow Gardens* 1885 5 *Famine Com. Rept. App. to Parts I and II* p. 87 *Report by Sir E. C. Buck (then Director of Agri. N. W. P.) dated 16th Oct. 1878 Annual Report Sett. Port Blair* 18 0 71 p. 43 *Bomb. Gaz. (Kathawar)* Vol. VIII p. 183 *Special Report from Director Land Records and Agri. Burma Quarterly Journal of Agriculture (Vol. XI)* 1840-41 p. 268 *Vol. III* 1847 49 p. 163 *Vol. VI* 1853 55 p. 217 *Vol. XI* 1863-65 p. 229 *Adams Wanderings of a Naturalist* 299 *Ain-i Akbari*, by *Abul Fazi* (Transl. by *Blochmann*) pp. 63 64 & 67

Habitat—According to the *Flora of British India* the Carrot is a native of Kashmir and the Western Himalaya at altitudes of from 5 000 to 9 000 feet. *Stewart* says, its range in Kashmir is from 3 200 to 5 000 feet and *Adams* alludes to the bear as feeding on the carrot and strawberry root. *Dr. Johnston* has in his herbarium of Simla plants a specimen collected on Murale hill which has large fleshy roots. Of this he remarks that it is a favourite food with bears.

Throughout India the carrot is cultivated by the Europeans mostly from annually imported seed and by the natives from an acclimatised if not an indigenous stock. In many parts of the country a greenish white carrot is preferred as being very hardy and productive. This rises some two or three inches above the soil, is a coarse root which possesses little of the flavour of the European carrot but it is able to withstand the extreme heat of summer and may be raised in some parts of the country throughout the year. It thus produces a return at seasons when other tubers or roots are scarce or not available. This is particularly the case in Behar (Patna) and some parts of the North West Provinces. *Sir Edward Buck*, while Director of Agriculture in these Provinces (1878) wrote a long and interesting note on carrot cultivation as a means of human food in periods of threatened scarcity or famine. The arguments then advanced have given to the subject of carrot cultivation in India an interest which as an ordinary garden crop it did not previously possess. The present account deals, therefore, more fully with the subject than most persons acquainted with Indian agriculture might be prepared to expect and it is hoped should necessarily ever arise for strenuous efforts being made to produce food, that a compilation like the present, from all existing sources of Indian information may prove useful.

Products of India

The Carrot

(G Watt)

DAU
Car

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History of the Carrot — Besides its Indian habitat the Carrot is a native of Europe (with the exception of the extreme north), of Abyssinia and North Africa of Madeira and the Azores and eastwards through Northern Asia to Siberia and Kamtschatka. By some writers it is held to be also a native of America, by others is regarded as but an introduced plant that has there become completely naturalised. In its wild state while in foliage flower and fruit it can with difficulty be distinguished from the cultivated plant but it has never been observed to produce in Europe the succulent root for which it is famed as a cultivated plant. It is well known however that care and a liberal supply of nourishment will produce conditions both in animals and plants that become hereditary and which once acquired will long continue even under the cruellest treatment. Darwin states that

the experiments of Vilmorin and Buckman on carrots and parsnips prove that abundant nutriment produces a definite and inheritable effect on the so called roots with scarcely any change in other parts of the plant. Conversely neglect or the consequences on a succulently developed plant running wild would naturally be to reduce the edible property until in time it might ultimately disappear. This retrogression is however much less than is commonly supposed indeed amongst scientific writers the belief prevails that plants or animals long domesticated (such as the horse or wheat) if we knew their ancestral forms would probably be found to never completely revert under any treatment. This may in fact be said to be the explanation of the very word acclimatisation. Darwin mentions many instances where the seeds of English annuals failed completely in the plains of India until they had been first successfully grown in Darjeeling and acclimatised seeds produced. Speaking of carrots he refers to a case where a consignment of English seed was sent both to Madras and to Hyderabad. The former failed but the latter was found to furnish a seed stock that succeeded admirably afterwards in Madras. It seems likely that in the wild state the tendency to produce a succulent root might more readily occur in a warm than in a cold country and that hence in all probability the natives of higher Asia may have first thought of cultivating the carrot. At all events Stewart states that in one part of Kashmir he found that the people eat the wild carrot a circumstance confirmed in a measure by the observation that bears eat it. Indeed it seems highly improbable from the simple examination of the wild carrot as met with in Europe that the idea could ever have occurred of cultivating it in the hope of producing an esculent root. Aitchison found the carrot wild in the Kuram valley but of the Hari rud (Afghanistan) he says the *sárdak* is not indigenous but a weed and an escape from cultivation in cultivated land also that the carrot is very extensively cultivated both in Afghanistan and in Persia. According to most writers the *δαυκον* of Theophrastus was the carrot and from that word the generic name as given by botanists has been derived. The early Muhammadan physicians who in many respects give indications of an intimate knowledge of the contemporaneous Greek medical science have handed down to the drug seller of the Indian bazárs the word *Dukus*. The *Makhean* under that name describes three umbelliferous seeds one of which may be *Daucus Carota*. At the same time it is known that the Greeks actually cultivated the Carrot in classical times though not perhaps to any great extent. The root seems however to have been associated with indecency from a very early period and similarly the Hindus present the carrot or the radish along with fruit to their friends at the Makar Sankranti. The Greeks often talked about *κέραρα ποικίλην τριή* and the individual so favoured was a *χερσασθορος*; carrots and horns are in fact closely associated. The Greeks called the plant *Phileon* because of its supposed connec

**UACUS
arota**

The Carrot

ISTORY

tion with amatory affairs. The word *Daukon* was given to an umbelliferous plant but not necessarily the carrot though generally accepted as such. *Carota* the Latin name was perhaps derived from *caro* flesh and *carota* is mentioned by *Apicius* the celebrated author on cookery (A D 230). Some writers however say that it is derived from *car* the Celtic for red. This seems highly improbable as it is doubtful if the Celtic race cultivated any vegetable so far back as the date given above for *Carota* from which Carrot is doubtless derived. The Persian names for the root are *Zardak* and *Gasar* its Sanskrit *Garjaru* and its Arabic *Fegar* words in all likelihood obtained from one source and that probably the Sanskrit. Persian scholars at all events accept *Gasar* as a simple Sanskrit word and not a derived one but the modern *Zardak* is said to come from *sar* golden or *sard* yellow. The resemblance of the Kashmir name *Mormuj* to some of the European names notably the Russian *Morkov*, is remarkable.

Carrots appear to have been regularly used in India in the time of Akbar (corresponding to the period of Queen Elizabeth in England). They are alluded to among the vegetables and pickles used by the Emperor but there occurs also the word *Shagāgul* which both Gladwin and Blochmann have translated wild carrots though as already shown this translation is most probably incorrect. While much reliance cannot be put on names of plants as historic evidences it is significant that throughout the languages of India indeed from Central Asia to Cape Comorin there should prevail in every language a name for the carrot which seems to have come from a common source. To that name is frequently added a further word meaning root or tuber. Thus in Tamil it is the *Gajjara kelangu* the *Kartu kishangu*. Whether or not we view *Kartu* as an approximation to the European derivatives *Carota* Carrot &c the further explanatory word simply means tuber or bulb. In this connection it may be added that Ainslie who wrote of Madras at the beginning of the present century gives the Tamil for Carrot as *Cārrot kalung*. The Telugu language among many other names for the carrot has the following *Gajjara gedda pita kanda* and *shikhā mulamu*. Here again the terminal words *gedda* (or rather *gadda*) and *mulamu* (the Sanskrit *mulam*) simply mean root or rhizome and are the equivalents of *jar* in Hindustani *vēr* in Tamil and *vēru* in Telugu. The derivation of the Latin name *Carota* mentioned above as is customary with writers on this subject has been given as *caro* flesh but the evidence of cultivation would almost lead to the inference that the carrot spread from Central Asia to Europe and if so it might be possible to trace from the Indian Sanskrit and Persian names those of Europe. Ainslie has no hesitation in affirming that India obtained the carrot from Persia but in the *Ain-i-Akbari* Abul Fazl makes no mention of carrot as having been introduced. While he goes into details regarding many of Akbar's fruits and vegetables specially mentioning those such as the pine apple which were less known he treats carrots as a matter of course. The Muhammadan invaders of India were perhaps for centuries before Akbar's time equally familiar with the *Garjara Gasar Gajr Zardak* the golden root and thus as a regular vegetable it was grown and eaten in India when in Europe it was scarcely known as more than a wild plant. As a somewhat curious historic fact it may in conclusion be stated that in the reign of James the First ladies adorned their head dresses with carrot leaves the plant having begun to be cultivated in England during Queen Elizabeth's time. It was largely grown in many parts of the Continent of Europe some time before it found its way to England. Belgium and Holland may especially be mentioned since in these countries even at

The Carrot	(G Watt)	DAU Carc
the present time it is a recognised field crop whereas in England as a whole it has not left the domain of garden production		
ABSTRACT OF THE PUBLISHED STATEMENTS REGARDING CARROT CULTIVATION IN INDIA		CULTIV 17
<p><i>Bombay Presidency</i>—Of Gujarat it has been said that carrots of two kinds are cultivated 'the long rooted and the blunt spindle form'. These are grown at various times in different parts of the province. Generally they are grown in garden beds from seed sown broadcast and are sometimes transplanted from the nursery in the <i>rabi</i> season like onions from which their cultivation does not differ except that a light and rich soil is preferred for carrots and great care is necessary so as not to break the roots in transplanting. The space between each plant is a full span. They take three months to mature but nipping or removing the heads prolongs the growth so that a supply can be ensured several months after the ordinary time of maturity. The young plants are also taken up in their half growth for the market. The produce is from 5 000 to 10 000 lb. The carrot is further stated to be sown in Gujarat from August to May and the crop gathered four months later. Of Cutch it is reported that carrots are 'much grown as a field crop'. Cutch is famous for its carrots. It is said of Poona that with the help of water and manure carrots are grown in large quantities in good black soil in the east of the district. The root is eaten as a vegetable both raw and boiled. It is also slit and dried in the sun when it will keep five or six months. When sun dried it is called <i>usris</i> and has to be boiled before it is eaten. In garden lands the carrot may be sown in Poona at any time but in dry crop lands in July or August only. In Khandesh the carrot is widely grown and with great success. The chief Khandesh carrot is long and reddish in flavour not much inferior to the best European kinds. The seed is always sown on the third or fourth day before the <i>amavasya</i> (e.g. the last day of the Hindu month) as it is believed that the woody heart of the carrot will thus be reduced to the smallest possible size. Of Ahmadnagar a curious process is reported of obtaining carrot seed which brings to mind the Panjáb method of cultivating a form of radish that has resulted in the production of a new vegetable namely the plant known as <i>Raphanus sativus var caudatus</i>. Instead of the root being eaten the treatment followed in the Panjáb has resulted in the production of a pod of great length which is eaten as a vegetable. The Ahmadnagar carrot seed is thus produced. When the crop is ready the husbandman cuts off a thick slice from the crown end of the root of the carrot. This he puts two fingers deep below the soil in any place where there is a liberal supply of water. After a few weeks the roots shoot into vigorous flower stems the seed of which is gathered four or five months after they have been planted. There are thus two crops in the year—one the root produced from the seed the other the seed produced from the root. In Kolhapur carrots are sown in September to November and the crop obtained three months later. During the first two months the crop is watered every ten days. In the third month the root begins to ripen and watering is stopped. A full sized carrot is four or five inches long and weighs about two ounces.</p> <p><i>Hyderabad Sind</i>—In the experimental farm various kinds of imported carrots have been experimentally grown. The Altringham was found to give the best results the yield having been in 1885-86 (<i>Farm Report page 35</i>) 7 360 lb an acre.</p> <p><i>Mysore and Coorg</i> are stated to produce a very good quality of carrots, in the <i>Central Provinces</i> occasional references occur to carrots as</p>		
		Hyder 17 Mysc 17 Cool 17 Cent Provir 17

DAUCUS
Carota

The Carrot

CULTIVATION

Panjab
180N W P
and Oudh
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a garden crop In the *Bengal Gasetteers* and other publications mention is also made of carrots In Rungpore for example they are said to be sown in October and November the crop being gathered in March and April but in Patna they are said to be sown in July and harvested in December and January Of the *Panjab* brief notices are made of carrot cultivation In Jhang for example it is said that the zamindar's food consists largely of carrots (*Replies to the Famine Commission page 228*) In Sialkot carrots are grown all over the district but the superior kinds of English carrots are little known or appreciated In Hazara the carrot is sown in September and October and gathered in December and January

The N W Provinces and Oudh — It has been estimated that there are 30 062 acres under carrots in these provinces 2 557 acres being dry land and the remainder irrigated In Oudh 35 721 acres of which 3 599 are on dry land Similar figures for the other provinces of India are not available but as the carrot is very nearly cultivated to the same extent in most provinces an approximate idea of the total area under carrots may be assumed In the N W P Agricultural Farm Report (1884 85 page 17) useful information is given regarding experiments made in the cultivation of European and the so called indigenous carrot The following results were obtained —

	Outturn per acre in maunds	Manure	Ploughings	Weedings	Waterings
Belgian Carrots—					
On ridges	153 5	Poudrette 250 maunds per acre	5	6	7
On lines	113 8				
Country Carrots—					
On ridges	355 3				
On lines	315 5				

The country thus gave at least double the return of the imported The seed was sown in September and October and the crop obtained in November and December Of Meerut it is said that carrot cultivation is becoming more general In 1870 there were 250 acres and in the replies to the Famine Commission it was contended that carrots were most useful under failure of *kharij*

Assam
182
Burma
183
Madras
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Of *Assam* *Burma* and *Madras* little can be learned regarding carrot cultivation and it seems probable that in these provinces the root is only raised as a garden vegetable Of *Burma* the Director of Land Records and Agriculture reports — It is planted at the beginning and reaped at the end of the rainy season The soil required for its cultivation is a porous moist sandy one It is only grown in *Burma* to a small extent

FAMINE
CROP
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ARGUMENTS REGARDING CARROT CULTIVATION AS AN EMERGENT CROP AT SEASONS OF THREATENED SCARCITY OR FAMINE — The following may be given as a brief abstract of the leading facts and arguments advanced in Sir E C Buck's report on this subject to which reference has been made above — In the half yearly agricultural report in the N W Provinces published in the local Gazette of September last I adverted to the extension of carrot cultivation which had taken place in consequence of the failure of the *kharij* in 1877 The replies received from enquiries instituted all over these provinces corroborate the ideas which had been formed of the reliance placed by the agricultural population upon carrots and to a less extent upon radishes, under failure of the ordi

Products of India

The Carrot (G Watt)	DA Ca
<p>nary autumn harvest The reason is simple When the <i>khari</i> grain crops fail and food stocks are reduced to a low ebb, the people have little to depend upon for food, unless purchased at a ruinous price, until March when the spring harvests are gathered But carrots and radishes can be raised in a hurry and being sown in September or October supplement the food supply in the winter months at a time when scarcity is greatest</p> <p>A large weight can be produced from a small area Irrigation which cannot be easily spread over a large extent in a year of drought is concentrated on a minimum space and can be utilised to its maximum power The facts gleaned by the enquiries are that in the upper portions of the provinces where the failure of the <i>khari</i> was greatest the cultivation of the carrot rose to three or four times the ordinary extent and would have increased much more had seed been obtained The price of seed rose from ₹7 or 8 a maund to ₹30 or 40 a maund and in some instances to a very much higher rate, especially in the Central Doab where the price ranged above ₹50 There is no doubt whatever that the carrot crop fed thousands of the starving poor It has been shown that allowing four seers a head per diem the carrots of an acre of land would support ten persons for 200 days could they eat carrots alone Carrots must however be supplemented by some grain but it may be presumed that a supply of grain (the outturn of about two acres) sufficient for ten persons for 200 days could be made to satisfy twenty persons for the same time if supplemented with the outturn The above estimate is framed on the estimate of an outturn of 200 maunds an acre which is much below the possible maximum an outturn of over 300 maunds an acre not being uncommon in addition to about 50 to 100 maunds of nourishing fodder for cattle The English outturn runs up to 20 to 30 tons or from 500 to 700 maunds an acre I was informed that it was in the year of scarcity 1869 that the Rohilkhand population first took the idea extensively from the cultivators of the Meerut side, and I am convinced from private enquiries that the practice is less common in the south than in the north of the provinces Mr T N Mukharji who under Sir Edward Buck's directions instituted enquiries into the subject of carrot cultivation during the period of threatened famine referred to above gives some instructive facts which were brought to his notice He sums up the benefits (and these are existing benefits) from carrot cultivation during such an emergency thus —1st carrots give a large amount of food in a small area and they afford food to both men and cattle 3rd they save the ryots from the hands of the banyas to whom they are bound to give up all grain, the banyas will not take carrots on account of their not keeping</p> <p>In concluding this brief notice of the existing information regarding the carrot as a famine food it may be said that some of the issues raised in connection with the enquiry have been since solved The experimental farms have for example established the fact that imported seed even were it procurable in sufficient quantity on a sudden demand in September would only give about a third of the return of acclimatised The suggestion therefore may be offered that an effort might be made to improve and extend the cultivation of an acclimatised stock, so that in the hands of as many ryots as possible there would always exist a certain amount of good seed The effort might also be made to ascertain how far the carrots of one province could be cultivated in another so that if the N W Provinces were threatened with famine it would be known what particular forms of Bombay or of Madras seed might advantageously be sent to these Provinces or sent from the N W to the Panjab to Central India to Bombay or to Bengal Cross breeding of Indian with European and of interprovin</p>	FA C

DAUCUS
Carota.**The Carrot.****FAMINE**
CROP

cial stocks might be carried on alongside of continuous efforts to acclimatise European seed of good quality **Sir Edward Bucks** farther remarks regarding the discovery of what parts of the south of Europe could afford seed suitable to India might also receive consideration for it is clearly a desirable feature of a subject like that of extended carrot cultivation to know the producers to whom application should be made for seed and this can only be learned after extensive comparative tests have been carried out

OIL
Seed
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Oil—Carrot **SEED** yields a medicinal oil this is obtained by distillation It is a pale yellow volatile oil and may be said to be the chief property of the seeds It has a strong penetrating odour and a warm and somewhat unpleasant taste

MEDICINE**Seeds**
187**Leaves****188****Roots****189**

Medicine—The carrot is not officinal in the English nor Indian Pharmacopœias but by the natives the **SEEDS** are considered a nervine tonic Boiled with honey and fermented they produce a spirituous liquor A decoction of the **LEAVES** and seeds is said to be used as a stimulant to the uterus during parturition The **ROOTS** are made into a marmalade which is considered refrigerant **Dr Dymock** writes that in the Concan a poultice of carrots and salt is used in tetter and the seeds are eaten as an aphrodisiac Formerly the carrot seeds (fruits) were used in European medical practice and they are so still in America They possess aromatic stimulant and carminative properties and were used in diseases of the kidney flatulent colic dropsy &c A poultice made of the roots is even at the present day resorted to in domestic medicine to correct the discharge from ill conditioned sores The raw rasped root is also deemed useful as a stimulating application and is made into an ointment with lard This is used in burns and scalds to good effect Pickled carrots are much lauded by Persian writers as a cure for spleen In the *American Dispensatory* it is stated that the wild root may be substituted for the seeds It is whitish hard branched and possesses a disagreeable smell

Pickled
190

SPECIAL OPINIONS—§ The crushed roots form the vehicle for many medicines used by native **Hakims** and have the reputation of having tonic properties (*Narain Misser Kothe Bazar Dispensary Hoshangabad Central Provinces*) The raw carrot when eaten acts as a mechanical anthelmintic (*Surgeon Major D R Thomson M D C I E Surgeon 1st District Madras*) Poultice of the root is useful in chronic and fœtid ulcers (*Surgeon Major George Cumberland Ross Delhi*)

Boiled and given to cattle with the view of making them fat (*Assistant Surgeon Annund Chunder Mookerji Noakhally*) The seeds are used to bring about abortion The roots are used as poultice (*Surgeon Major Robb Civil Surgeon Ahmedabad*) Used in dysentery and enlargement of spleen (*John McConaghy M D Civil Surgeon Shahjahan pore*)

HEMISTRY
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Chemistry of the Carrot—The constituents of the root are crystallisable and uncrystallisable sugar, a little starch extractive gluten albumen volatile oil vegetable jelly or *pectin* malic acid saline matters lignin and a peculiar crystallisable ruby red neutral principle without odour or taste, called *carotin* This latter principle has been well studied by **Husemann**, who gives it the formula $C_{18}H_{24}O$ **Husemann** has also described a colourless compound *hydrocarotin* $C_{18}H_{20}O$ which exists with *carotin* in the juice of the carrot and is probably changed into the latter by oxidation as the plant develops in growth The substance called *vegetable jelly* was by some considered a modification of gum or mucilage combined with a vegetable acid **Braconout** found it to be a peculiar principle and named it *pectin* from the Greek *πηκτις* expressive of its characteristic property of gelatinising It exists more or less in all vegetables, and is

The Carrot

(G Watt)

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abundant in certain fruits and roots from which jellies are prepared It may be separated from the juice of fruits by alcohol, which precipitates it in the form of a jelly This being washed with weak alcohol and dried yields a semi transparent substance bearing some resemblance to *sch thyocolla* Immersed in 100 parts of cold water it swells like bassorin and ultimately forms a homogeneous jelly A striking peculiarity is that by the agency of a fixed alkali or alkaline earthy base it is instantly converted into pectic acid which unites with the base to form a pectate'

The following table (abstracted from an extensive series of analyses published in *Anderson's Agricultural Chemistry*) exhibits the comparative value of carrots with five other articles of human and cattle food —

	Nitrogenous compounds	Oil	Respiratory compounds	Fibre	Ash	Water
Oats	11 85	5 89	57 45	9 00	2 72	13 09
Wheat	11 48		73 52	0 68	0 82	13 50
Hay	9 40	2 56	38 54	29 14	5 84	14 30
Carob bean	3 11	0 41	62 51	18 60	2 80	12 57
Carrot	1 87		9 91	3 07	1 11	86 04
Turnips	1 27	0 20	4 07	1 08	1 71	91 47

Mr Horsford gives the analysis of the carrot as 10 66 nitrogenous matter 84 59 non nitrogenous ingredients and 5 77 inorganic constituents These figures seem to conflict somewhat with Professor Anderson's table given above especially in the ash but turning to Johnson's *How Crops Grow* the ash is shown to vary from 5 1 to 10 9 per cent The average of ten analyses gave the ash as 7 5 of the total weight of root which was composed as follows 37 0 Potash 20 7 Soda 5 2 Magnesia 10 9 Lime 1 0 Oxide of Iron, 11 2 Phosphoric acid 6 9 Sulphuric acid 2 0 Silica and 4 9 Chlorine Professor Anderson's table is doubtless comparatively correct and it therefore shows the value of carrots relative to the other foods there presented

Carrots contain starch the granules of which are very small and round and in some cases muller shaped with distinct central hilums (*Bell*)

Food and Fodder — The so-called ROOT as produced in garden cultivation, constitutes an important item in the supply of the markets frequented by the European community Although certain classes of Hindus in Bengal object to eat the carrot on account of some fanciful resemblance to beef or because of its smell still the natives of India as a whole are year by year taking more freely to it At the same time it must be added that although by the Muhammadans and certain classes of Hindus the carrot has been cultivated for ages it is only within recent years that it has become a recognised article of diet By certain classes the young carrots are only used as pickles By others the root is first boiled in water then squeezed out and cooked in *ghí* This latter practice accords with the scientific injunctions of the chemist *vis*, that the turnip carrot and other such roots being deficient in fat can only become staple articles of human diet if combined with fat or oil Carrots are generally cooked with fat in Europe and perhaps the grain with which they are eaten in India supplies even in famine time enough fat to sustain life

In Europe carrots have become a recognised article of cattle food In India the opinion prevails that to give horses a daily small allowance of carrots improves the gloss of the coat Carrot tops afford a useful fodder for cattle and the contention that carrots should be resorted to in times of famine is strengthened by this fact

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FODI
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DEBREGEASIA
hypoleuca**The Debregeasia Fibre****DOMESTIC**
tooth sticks**104****105**

Coffee is often largely adulterated with carrots, and the reputed use of carrots as an adulterant in marmalade doubtless rests on the presence of the vegetable jelly referred to above under the paragraph—
Chemistry of the Carrot

Domestic Uses—The peduncles and flower stalks are used by the hill-tribes as tooth sticks

Davallia, Smith *Hooker and Baker, Synopsis Filicum, 88, Beddome, Ferns British India and Ceylon, p 58*

A genus of handsome ferns named in honour of the Swiss botanist Davall the chief characters of which are the creeping rhizome and the involucre impressed in the substance of the margin of the frond so as to form an urceolate cyst like a miniature capsule The economic history of Ferns is extremely imperfect The above brief notice has been thought desirable so as to assign a place and number in the present work for one of the most extensive and most elegant of the genera in the hope that with the advance of knowledge we may be able to mention the uses to which some of the species are put

Deadly Nightshade see *Atropa Belladonna, Linn, Vol I, No 1614.*

Deal, see *Fir Pine* and *Pinus*

DEBREGEASIA, Gaud Gen Pl, III 390**106**

Debregeasia hypoleuca, Wedd Fl Br Ind V 591, URTICACEÆ

Syn—DEBREGEASIA BICOLOR *Wedd in DC Prod URTICA BICOLOR Roxb BOEHMERIA SALICIFOLIA Don B HYPOLEUCA Hochst; MISSISSYVA HYPOLEUCA Wedd in Ann Sc Nat MOROCARPUS SALICIFOLIUS Blume*

Vern—*Puruni* N W P *Tashārī* or *tashārī sār* KUMAON *Sihārū* KANGRA *Kharmala shakai* TRANS-INDUS and AFG *Chainchar chair yili* or *chenyul amrer, sandari* JHELMUM *Sansārū süss* CHENAB; *Siaru talsari thana* RAVI *Pincho prin siaru* SUTLEJ

References—*Roxb Fl Ind Ed CBC 656 Brandis For Fl 405 Gamble Man Timb 326 Stewart Pb Pl 215 Atchison Cat Pb and Sind Pl 136 Atkinson Him Dist 317 708 Report on Fibres shown at the Colonial and Indian Exhibition by Cross Bevan King and Watt, p 52 Special Report furnished by the Conservator of Forests, N W P*

Habitat—A large shrub of the western temperate Himālayas from Kashmir and the Salt range to Kumaon altitude 3 000 to 5 000 feet Distributed to Afghānistān and Abyssinia

Fibre—All the species of *Debregeasia* afford strong and useful fibres, which are more or less extracted by the hill tribes and used for ropes and cordage Our knowledge of these fibres is however too imperfect to allow of separate accounts being given in which the comparative merits or the fibres from the various species would be discussed It has therefore been thought desirable to draw up in one place a brief review of all the opinions which have been published regarding these fibres but it must be added that should hopes ever be entertained of the utilisation commercially of *Debregeasia* fibre the first step would naturally be to have the individual properties of the species thoroughly investigated In general terms it may be said that writers on Panjāb products who refer to a *Debregeasia* fibre are speaking of *D hypoleuca*, descriptions dealing with the Central Himālayas (e.g. Kumaon Garhwal and Nepal) refer to *D hypoleuca* and *D velutina*, of the Eastern Himālayas (e.g., Sikkim, Assam, and Burma

FIBRE
107**D 107**

to *D. velutina* and *D. Wallichiana*, while the *Debregeasia* fibre of the mountains of Western and Southern India is exclusively *D. velutina*.

Of Panjáb writers Stewart says ' In the eastern part of the Panjáb its bark appears as in the North Western Provinces to be used for making ropes but it is not generally employed in this way ' Mr Baden Powell remarks of *D. hypoleuca* that it is not yet recognised as a merchantable commodity. The fibre is valued for net ropes on account of its resisting the action of water. The fibre it would appear is prepared by the hill people without steeping. It is merely dried and when brittle is beaten the fibre separates easily, the plant is cut in October. But Dr Royle quotes Capt Rainey then Political Agent at Sabáthú who describes the process of preparation as laborious. The plant being cut is exposed one night in the open air. The stalk is then stripped of its leaves and dried in the sun when dry it is placed in a vessel with water and wood ashes and boiled for 24 hours. After boiling the fibre is well washed in a stream. The fibre is then sprinkled with flour of the grain *kodra* (*Paspalum scorbulatum*) and left to dry it is then ready for spinning. Capt Huddleston (*Trans Agri Hort Soc VIII p 275*) in his paper on the Hemp of the Himálays appears under *jur kundalu kundalu*, and *kubra* to be alluding to this fibre. He says— It grows chiefly in the northern parts of the district in great quantities it also grows in the middle ones, and from its fibres the natives make rope for tying up their cattle and snow sandals. One bundle will produce about a seer of fibre but it is not collected for sale. The plant grows about eight or nine feet high and the stalks are about the size of a finger in thickness. It is cut in the cold season and the stalks are soaked a few days in water before the fibre is stripped off from the thick end like hemp. Passing further East Mr Atkinson writes of Kumaon (and under the name *D. bicolor*) ' The *tush yára* is very common all over the lower hills ascending as high as 7,000 feet and is particularly abundant in the Siwálíks. It yields a very strong cordage fibre. Brandis (in his *Forest Flora of North Western and Central India*) says— Twine and ropes are made of the fibre. Gamble also repeats this statement but on the other hand the Conservator of Forests of the North Western Provinces in a recent report, writes of Jaunsar forests that *D. hypoleuca* is not used for fibre.

Considerably more information is available regarding *D. velutina*. In the Madras Manual of Administration (*Vol I 313*) it is mentioned as one of the chief fibre plants of the Presidency. The Manager of the Glen Rock Fibre Company Wynaad reported to have sent a consignment presumably of this fibre to London. It was valued at £70 per ton. Of the Madras Presidency it is commonly stated that it is much used both by the natives generally and the managers of coffee estates. Mr J Cameron (Superintendent of the Botanic Gardens Bangalore), in a note communicated to the writer states that this is one of the commonest and most conspicuous plants in the Wynaad and Nilgiri sholas. Its fibre is used for bow strings and it would only appear to require to be better known to be much appreciated. Dalzell and Gibson describe the plant (the *caps*) as met with in the Concan and Ghát jungles but make no mention of its fibre. Mr W A Talbot also alludes to it as found in Kanara (*Bombay Gazetteer XV 444*) and Mr Lisboa (*Useful Plants of Bombay*) says it is common at Maháleshwar and the Konkan jungles. The inner bark yields a fibre which in Ceylon, &c, is used for cordage and fishing lines."

Of *D. Wallichiana*, Mr Gamble makes the statement that it yields a "fibre used sometimes for cordage."

The reader is referred for further particulars to the Selections of the

DECAMALI
Gum

The Debregeasia Fibres.

FODDER
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TIMBER
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Records of the Government of India in the Department of Revenue and Agriculture (Vol I No 18 of 1888 89) where under the heading of Rhea and allied Rhea fibres the writer endeavoured to clear up the ambiguity that prevails regarding *Boehmeria*, *Villebrunea*, and *Debregeasia*.

Fodder —Stewart mentions that the leaves are eaten by sheep

Structure of the Wood —Soft and grey of no value

Debregeasia velutina, Gaud Fl Br Ind, V, 590 Wight, Ic, t ^[1959]

Syn —DEBREGEASIA LONGIFOLIA Wedd in DC Prod MISSIESSYA VELUTINA Wedd in Ann Sc Nat MOROCARPUS LONGIFOLIA Blume URTICA LONGIFOLIA and ANGUSTIFOLIA Blume Burm ² URTICA BICOLOR Wall U VERRUCOSA Moon; CONOCEPHALUS NIVEUS Wight Ic t 1952 Dals and Gibs Bomb Fl 239.

Vern —Tashari: NEPAL Kamhyem LEPCHA Kapsi BOMB Kapsi KAN Pwot chaubeng putchaw Burm

References —Brandis For Fl 405 Kurs For Fl Burm, II 428 Beddome Fl Sylu (Man 226 t 26 f 5) Gamble Man Timb, 326 Dals & Gibs Bomb Fl 239 Lisboa U Pl Bomb 126 234 Madras Man Adm I 313

Habitat —A tall shrub of the sub-tropical Himálaya from Kumaon to Sikkim Assam the Khasia Hills Tenasserim the Deccan Peninsula from the Concan to Cape Comorin altitude on the Himálaya from 2,000 to 5 000 feet on the Nilghiri hills 7 000 feet

Fibre —See the paragraph above under *D hypoleuca*

Structure of the Wood —Heartwood reddish brown hard sapwood white

FIBRE
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TIMBER
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D Wallichiana, Wedd Fl Br Ind, V 591

Syn —DEBREGEASIA LEUCOPHYLLA Wedd in DC Prod MOROCARPUS WALLICHIANUS, Kurs MISSIESSYA WALLICHIANA Wedd URTICA LEUCOPHYLLA Wall

Vern —Puruni NEPAL Senén LEPCHA

References —Kurs For Fl Burm II 428; Gamble Man Timb 326 Thwaites En Ceylon Pl 262

Habitat —A small tree (20 to 30 feet in height) met with in the Eastern Himálaya from Sikkim to the Khásia hills Pegu, and Tenasserim altitude 2 000 to 4,000 feet (Fl Br Ind) Gamble says it even ascends to 7 000 feet

Fibre —See the paragraph above under *D hypoleuca*

Structure of the Wood —Annual rings distinctly marked by a white line A very pretty plant with round leaves of the purest white beneath

FIBRE
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TIMBER
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DECAISNEA, Hook f & Thoms Gen Pl, I, 42

Decaisnea insignis, Hook f & Th Fl Br Ind I 107 [BERBERIDÆ]

Syn —SLACKEA INSIGNIS Griff Itn Not 187

Vern. —Lúdúma BHUTIA Nomorchu LEPCHA

References —Hooker s Him Four, II 197 Balfour, Cyclop I 902; Treasury of Bot 388

Habitat —An erect shrub which inhabits the eastern parts of the Himálaya, in Bhutan and Sikkim in altitudes between 6 000 to 10 000 feet

Food —Produces a very palatable FRUIT which ripens in October, and which is eaten by the Lepchas of Sikkim

FOOD
Fruit
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Decamali Gum—see *Gardenia lucida*

D 207

DEER *Jerdon, Mammals of India, p 248*

The name Deer is applied to a group of Ruminant Mammals characterised by possessing osseous solid horns or antlers which are shed annually at a period contemporaneous with the renewal of the hair also by the absence of a gall bladder They constitute the family CERVIDÆ the BOVIDÆ (or oxen buffalos, sheep goats and antelopes) having a bony prolongation from the skull a core encased by a hollow perennial horn which grows from the base throughout the life of the animal The position of the Musk deer and of the Deerlets is open to considerable difference of opinion Most authors place them in one or in two families intermediate between the CERVIDÆ and the BOVIDÆ Others regard the musk-deer as representing an aberrant genus of the BOVIDÆ (on account of its possessing a gall bladder) and view the Deerlets as transitional forms of CERVIDÆ approaching the antelopes and the musk deer

The classification of even the more highly developed CERVIDÆ is admittedly imperfect but most authors recognise the following sub families and genera to which in a popular work such as the present may be sub joined the MOSCHIDÆ or Musk deers and the TRAGULIDÆ or Mouse deers —

FAMILY CERVIDÆ

SUB FAMILY I —Cervinæ —THE STAGS PROPER

Genus CERVUS —(1) **C Wallichii**, the Kashmir Stag and (2) **C affinis**, the Sikkim Stag

SUB FAMILY II —Rusinæ —THE RUSINE STAGS

Genus RUCERVUS —(3) **R Duvaucelli**, the Swamp Deer and (4) **R Eldii**, the Manipur Stag

Genus RUSA —(5) **R Aristotelis**, the Sambar Stag

Genus AXIS —(6) **A maculatus**, the Spotted Deer (7) **A porcinus** the Hog Deer

Genus CERVULUS —(8) **C aureus**, the Rib-faced or Barking Deer

FAMILY MOSCHIDÆ —THE MUSK DEER

Genus MOSCHUS —(9) **M moschiferus**

FAMILY TRAGULIDÆ —THE CHEVROTIANs OR DEERLETS

Genus TRAGULUS —(10) **T Napu**, the Javan Deerlet

Genus MEMINNA —(11) **M indica**, the Indian Mouse-deer

Reference has been made above to the difference of opinion that prevails among zoologists as to the true position of the Musk deer and the Deerlets These agree with each other in having no horns and in possessing long canine tusks and also in being higher over the croup than the shoulders But the Barking deer has also long canine teeth and is considerably higher on the hind quarters At the same time it has been contended that some of the members of the genus AXIS have been found to possess a gall bladder **Professor Flower** is disposed to regard the absence of horns as an argument in favour of a Cervine position since the male of none of the Bovine animals are hornless The most natural arrangement would therefore appear to be that given above which would pass into the BOVIDÆ with the Nilgai the Antelopes and the Goral to the Goats Sheep and Oxen

The above brief indication of the classification (in a work on Economic Products) has been deemed necessary from the difficulty that exists in grouping the skins horns antlers musk &c according to some stand

Mus

De

DEER	The Spotted Deer
	<p>ard that would be found to correspond with the arrangement adopted in the classification of the animals in purely Zoological Museums</p> <p>It is not intended in this work to deal with sport but it may be worth mentioning (in connection with the subject of domestication) that in the <i>Asn i Akbari</i> an interesting account will be found of the fighting deer kept by the Emperor also of the sport of hunting for these animals by means of snares attached to trained deer It is stated that His Majesty had 12 000 deer kept for these purposes</p> <p>The following paragraphs will be found to contain the vernacular names of the commoner species their habitat and other peculiarities but for further particulars regarding the Economic Products derived from these animals the reader is referred to the following subject headings — Hides and Skins Leather Horns Antlers and Ivory For the Bovine animals to Oxen and to Sheep and Goats</p>
212	<p>Axis maculatus (Jerdon, Mam, 260)</p>
	<p>THE SPOTTED DEER</p> <p>Vern — <i>Chital chitra</i> (chitri zhanh male) HIND <i>Boro-khotiya</i> (RUNG PORE) <i>chatidah</i> (BHAGULPORE) <i>huriya</i> (GORAKHPORE) BENG <i>Sarang</i>, BELGAUM <i>Polli maun</i> TAM <i>Dupli</i> TEL <i>Lupi</i> GOND <i>Sarga jais mikka</i> KAN <i>Zubbi</i> ARAB <i>Gousun</i> PERS</p>
	<p>Habitat — Throughout the greater part of India except the Panjáb but apparently not found east of the Bay of Bengal It is met with abundantly on the lower and outer slopes of the Himálaya and immense herds may be seen in the Sunderbuns It frequents forests bordering on streams and is gregarious very often occurring in herds of 30 to 40 or even 100 The most elegant and graceful of Indian deer it is said to be found only in fascinating bits of country its dappled hide being seen to sparkle in sunlight of the mixed bamboo glades as it bounds from the intruder on the slightest indication of danger</p> <p>See an interesting account of this deer in the Kanara Gazetteer, page 101 It is there stated to be rapidly being exterminated</p>
<p>Skin 213 Antlers 214</p>	<p>SKIN AND ANTLERS — The skin a yellowish or rufous fawn spotted with white is much admired for ornamental purposes The antlers have the tines longer than the royals or posterior tines They are shed in February and March and are commercially in considerable demand but actual statistics cannot be obtained Liverpool is said to have imported from 1851—55 20 000 of these antlers and during the same period 700 of the skins The following note furnished by Major A E Ward will be read with interest — There is a considerable trade in the horns as well as in the skins of the spotted deer Formerly in the times when this deer was plentiful some of the Cawnpore leather firms gave contracts to men who supplied <i>shikáris</i> with powder and ball, and thus ruined the shooting in many parts of the Terai and the Duns One firm gave a wholesale price of Rs 50 per hundred skins and at this rate attracted many offers of sale The flesh is exchanged by the hunters for flour, &c. The tanned leather does not wear well</p>
	<p>"The spotted deer is very irregular in its breeding habits It accordingly sheds its horns at no absolutely fixed period The horns may thus be seen to be velvet on some individuals and quite hard in others at almost any season of the year"</p>
<p>FOOD 215</p>	<p>Food — The flesh 'is very good eating in the cold weather months.' Ainslie (<i>Mat Ind</i>, I, 110) says as venison it is not worth much, unless when caught young and fed properly" In Kanara an animal on account of its flesh is said to sell for Rs 8</p>

The Hog and Rib-faced Deer, the Sikkim Stag

(G Watt)

Axis porcinus (Jerdon, Mam, 262)

THE HOG DEER

Vern.—*Párá* HIND *Nuthrins haran* BENG; *Khar laguna*, NEPAL TARAI but *Sugoria* is also sometimes given to it

Habitat—Throughout India, though less frequent in the central parts abundant in Assam Burma and Ceylon It is seldom found in forest land preferring open grassy jungle It lies all day in sheltered thick parts and only rises when run upon by the sportsman or his beaters It gets its name of Hog-deer on account of its awkward gait Major Ward writes that it leaves the thickets for swampy ground directly the hot weather comes on and may often be found in snipe jheels in the cold weather

Skin and Antlers—According to the same authority the skin of this species is not in much demand

Food—The meat is said to be fair by some writers but Major Ward is of opinion that it cannot be recommended His words are 'This deer suffers greatly from internal parasites And although the flesh is at times fairly good what between these intestine parasites and the fact that the skin is often pierced by the grub of the *Bot*, I think the meat cannot be recommended'

Cervulus aureus (Jerdon, Mam, 264)

THE RIB FACED DEER, the BARKING-DEER or MUNTJAC of India, the RED HOG DEER in Ceylon

Vern—*Kakar bherki jangli bukra* HIND *Maya* BENG; *Ratwa* NEPAL *Karsidr* BHOTIA *Siku suku*, LEPCHA *Kondakuri* BEL GAUM *Advukuri* KAN *Gutra, gutri* GOND *Bekra baskur*, or *Kekar*, MAR; *Kuka gori*, TEL *Gee* BURM

Habitat—India Burma Ceylon the Malay Peninsula Sumatra Java, Borneo &c. Sportsmen describe this as a retiring little forest animal generally found alone or at times in pairs "creeping as Hodgson remarks through the tangled jungle or under fallen trees It is said in Kanara to love the dense shade of the *Kárvu* (*Strobilanthus*) that covers Sahyádrí slopes (*Kanara Gazetteer* page 102)

Skin and Antlers—Major Ward says that 'the skin of the barking deer is very largely in demand as it is very tough when tanned Shoes and leather socks are made in great numbers from it Sahanpur Meerut and Dehra *mochees* are the principal dealers in this hide.'

The horns are too small to be of value

Food—'It is excellent venison, but rarely carries any fat' This statement is confirmed in the *Gazetteer of Ratnagiri*, but the venison is said to be all the more appreciated in a district where mutton is scarcely attainable

Cervus affinis (Jerdon, Mam, 251)

THE SIKKIM STAG

Vern.—*Shon* TIBETAN

Habitat—The Eastern Himálaya (Sikkim side of Tibet Chumbi Valley) Major Ward is however very doubtful if this stag is to be found at all in the Chumbi Valley 'Mr Ney Elias tells me' he writes that it is scarcely known in those parts even as an animal which exists'

Antlers.—According to Major Ward the antlers are very large a pair in Simla measuring 54 inches in length He adds—'A magnificent pair of antlers which I have at home quite dwarfed the pair of Kashmir stag's horns, 47 inches long, now in my possession at Simla'

DEER

The Kashmir Stag and Musk Deer

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Cervus Wallichii (Jerdon, Mam, 250)

THE KASHMIR STAG

Vern — *Barasingha* HIND *Hangul* or *Honglu* KASHMIR

Habitat — Kashmir the Sind valley to Budrawar and Kishtar eastward inhabiting pine forests at altitudes of 9 000 to 12 000 feet descending to lower levels in autumn and winter The larger stags Major Ward writes, seldom come below 7 000 feet In the spring this animal migrates from the valleys of Kashmir and wanders far often crossing the lower passes ~~via~~ the Mangan the Togila &c It clings, however to country that is fairly wooded It is rapidly decreasing in number

Antlers

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Antlers — The horns form a portion of the tribute paid by the shikaris to the Māhārāja of Jammu The best are sold at high prices from ₹15 to ₹30 per pair and are bought by taxidermists and collectors of horns

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Moschus moschiferus (Jerdon, Mam 266)

THE MUSK DEER

Vern — *Kastura* HIND *Rous rus kasturi* KASHMIR *La lama* TIBET ; *Rib jo* LADAK *Bena* KANAWAR *Mussuck naba* PAHARI

Habitat — Found throughout the Himalaya at elevations above 8 000 feet distributed to Central and Northern Asia and Siberia The musk deer is a forest loving animal keeping much to one locality It is wonder fully sure-footed and is able to leap and bound over the steepest and most broken ground Colonel Markham (*Four Sporting Adventures and Travel in Chinese Tartary and Thibet*) says On a gentle slope I have seen them clear a space of more than sixty feet at a single bound for several successive leaps and spring over bushes of considerable height at the same time It is an exceedingly shy animal of nocturnal habit and not much larger than a greyhound Of all ruminants it is reported to eat the least, and although no connection can be traced between the nature of the food it eats and the production of musk it is a common opinion among traders that those reared in forest-clad countries are better than those met with in open rocky regions It is said to eat the tangled grey lichen (*Usnea*) that hangs from trees everywhere on the higher Himālaya and the leaves of various shrubs as also grasses roots &c Colonel Markham alludes to a popular opinion that it eats the leaves of a laurel (*kedar pattu*) probably *Litsaea umbrosa* a small tree or bush frequent up to about 7 000 feet but certainly not common at the altitudes where the musk deer lives Major Ward however, repudiates this statement characterising it as a native absurdity

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MUSK

MUSC GRAINE D AMBRETTE *Fr* , MOSCHUS, BIZAM *Germ* , MUSCHIO, *It* ALMIZELE *Sp*Vern — *Kasturi muskh* HIND *Kashturi* BENG *Kasturi* MAR TAM TEL MAL *Musk muskh muskh* ARAB *Mushk* PERS ; *Mushk nafa* PB *Mrganabhi kasturi* SANS *Kado* BURM

References — *Sterndale Mam of Ind* 494 *Presse Art Perfumery* 246 *U C Dutt Mat Med* 279, *Moodeen Sheriff Supp Pharm Ind* , 177 *Pharm Ind* 282, *U S Dispens* 15th Ed p 962, *Baden Powell Pb Prod* 189, *Ainslie Mat Ind* I 228 *Ure Dict Arts &c* III 213 *Balfour Cycl Ind* 1021 *Spons Encycl* 1521, *Davies Trade and Resources of the N W Boundary of India* CCXXXVII

RIPTION
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Description — The musk is milky for the first year or two afterwards granular the dung of the males smells of musk but the body does not, and the females do not in the slightest degree "The musk-deer is

much sought after for its musk many being shot and snared annually A good musk pod is valued at from 10 to 15 rupees The musk as sold is often much adulterated with blood liver &c One ounce is about the average produce of the pod A few anatomical details of interest (by Dr Campbell) may be here given — The musk bag lies at the end of the penis and might be termed a præputial bag It is globular about 1½ inch in diameter and hairy with a hole in the centre about the diameter of a lead pencil from which the secretion can be squeezed The orifice of the urethra lies near this a little posteriorly Round the margin of the opening of the gland is a circle of small glandular looking bodies The musk when fresh is soft not unlike moist gingerbread The anus is surrounded by a ring of soft hairs the skin under which is perforated by innumerable small pores secreting an abominably offensive stuff which pressure brings out like honey The scrotum is round and naked There is besides a peculiar organ or gland on the tail which indeed is composed almost wholly of it The tail of the male is triangular nude above thick greasy partially covered with short hair below and with a tuft of hairs at the end glued together by a viscid liquor It has two large elliptic pores beneath basal and lateral the edges of which are somewhat mobile, and the fluid which appears to be continually secreted has a peculiar and rather offensive odour (*Ferdon's Mammals p 268*) Colonel F Markham thus describes the preparation of the so called musk pod The musk pods which reach the market through the hands of the native hunters are generally enclosed in a portion of the skin of the animal with the hair or fur left on it When they have killed a musk-deer they cut round the pod and skin the whole of the belly The pod comes off attached to the skin which is then laid with its fleshy side on a flat stone previously heated in the fire and thus dried without singeing the hair The skin shrinks up from the heat into a small compass and is then tied or stitched round the pod and hung up in a dry place until quite hard This is the general method of preparing them but some put the pod into hot oil instead of laying it on a hot stone but either method must deteriorate the quality of the musk as it gets either completely baked or fried It is best both in appearance and smell if the pod is at once cut from the skin and allowed to dry of itself Mr F Peak (of Peak Allen & Co) wrote to Mr Piesse (*Art of Perfumery p 256*) that The thin bladder like skin dries in the sun in a few hours that in the hair pods on the contrary gets quite roasted in the process of preserving and preparing I sent both kinds home to ascertain which was best and that in the pods without the hairy skin was declared to be far superior Referring to the process of drying skin around the pods he adds By the continued heat much of its odour is driven off and it is consequently deprived of its qualities as a remedial agent and for the use of the perfumer is greatly deteriorated (See also Peak P J Tr Feb 1861)

Adulteration —The extent to which musk adulteration has been carried seems natural enough, especially at the present time when nearly every commercial article is counterfeited to some extent The high price paid for the perfume the uncertainty of the supply and the difficulty of detection must have all naturally tended to suggest a certain amount of adulteration Colonel Markham writes 'I have often seen pods offered for sale which were merely a piece of musk deer skin filled with some substance and tied up to resemble a musk pod with a little musk rubbed over to make it smell These are easy to detect, from there being no navel on the skin it being cut from any part of the body But the musk is sometimes taken out of real pods, and its place supplied by some other substance, and these are difficult to detect even if cut open, as whatever is put in is made to resemble

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Musk and

ADULTERATION

ble musk in appearance and a little genuine added makes it smell nearly as strong. Some have only a portion of the musk taken out and its place thus supplied; and others have all the musk left in but something added to increase the weight. The above description of the process and materials of adulteration differs but little from that written in 1596 by John Huygen van Linschoten. That early traveller was misinformed when he stated that the true musk was the testicles of the animal and this mistake his contemporary Dr Paludanus corrected. He wrote: "Some are of opinion that muske groweth at certain times of the yeare about the navell." But Linschoten's account of the Chinese adulteration of the article traded in by the Portuguese at so early a date is worth quoting in this place. He says that having killed the animals they let them lie and rot blood and flesh together which done they cut them in pieces both skinned flesh and blood all mixed together and thereof make divers purses which they sow (in a round forme) and are in that sort carried abroad and sold. These purses are commonly of an ounce weight the peece and by the Portuguese are called *Papos* but the right *Papos* and perfect *Mosselat* is the bullockes or stones of the beast the others although they passe among them for *Mosselat* are not so good as the stones therefore the Chinaes (Chinese) who in all things are very subtil make the purses cleane round like the stones of the beast therewith to deceive the people and so the sooner to procure them to buy it. So again he says: "The Chinaes are very deceitful in selling of *Mosselat* (or Muske) for they folsife it verie much sometimes with oxen and cowes livers dried and beaten to powder and so mixed with the *Mosselat* as it is daily found by experience in searching of it."

Commercial Forms of Musk —Piesse says there are three kinds *vis* —

'The *Cabardien* or Russian Musk which is rarely if ever adulterated from its poorer fragrance however it does not fetch more than 8s an ounce in the pod. The *Assam Musk* is next in quality it is very strong but has a rank smell the pods are very large and irregular in shape it fetches about 24s per ounce in the pod. The *Tonquin* or Chinese Musk yields the kind mostly prized in England and is more adulterated than the former market price from 26s to 32s per ounce in the pod.' Further on Mr Piesse again refers to the *Assam Musk* — "The musk of Assam and South Thibet reaches Europe by way of Calcutta. It is sent in bags enclosed in a chest of wood or tin plate which holds about two hundred pods. The form of this musk is more valuable than that of the Nankin musk. Although Mr Piesse publishes extracts from his correspondence with Peak Allen and Co regarding Himálayan musk he does not (*in his Art of Perfumery*) furnish any information as to the comparative value of Himálayan and Assam. Dr U O Dutt says that according to Sanskrit literature there are three kinds of musk— The *Bhāvaprakāśa* describes three varieties of musk namely *Kamrupa*, *Nepála* and *Káshmira* musk. *Kamrupa* musk is said to be of black colour and superior to the others. It is probably China or Thibet musk brought to India *vis* Kamroop in Assam. *Nepála* musk is described as of a blueish colour and intermediate quality. *Kashmira* is of inferior quality."

The following note regarding Panjáb musk has been obligingly placed at the writer's disposal by G G Miniken, Esq, Deputy Conservator of Forests —

In Bashahr on the Sutlej and on the Rupin and Paber rivers the Musk-deer was at one time plentiful but it is generally stated that it is not now so numerous.

The right of hunting the musk deer belongs to the Rajah, and he employs trained shikáris to hunt them, but this right is in truth not respected

COMMERCIAL FORMS

Cabardien

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Assam

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Tonquin

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Panjab Musk

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The Musk Deer (G Watt)	DEER
<p>Villagers all over the country shoot for themselves, and the pods obtained are sold to chemists at Simla and Masouri. The Rajah's shikaris use nets which are set up across some gap or glade in the forest and with dogs drive the deer into the nets where they are shot and the pod extracted from the male while it is hot. The musk is said to be of better quality if the pod be taken out at this time. The musk is sometimes adulterated by mixing with it the blood of the slain deer and reduced by boiling to a soft mass. The test of genuine musk is made by passing a thread through <i>asafetida</i> (<i>Hing</i>) and then through the pod. If after this, the smell of the <i>Hing</i> remains the musk is not genuine.</p> <p>Musk is used as medicine. It is said to be useful in venereal diseases and for wounds. In the first case a small pill is taken once a day for two or three days. In the second case a bit about the size of a grain of rice is applied but if too much is put on the wound the flesh swells. Musk mixed with <i>ghu</i> called in the plains <i>Hawan samaghr</i> is used to scent rooms and to keep off bad air. It is also burnt as incense in temples. Bushahiris smoke it mixed with tobacco and it is said to have a mild intoxicating effect. But it is especially prized for its stimulative action when taken internally particularly for incompetence. It is useful for pains in the back which it also strengthens.</p> <p>About Rs 5000 worth is sold annually in Bushahir and it is bartered in the Rampur bazár for down country produce. Its price averages Rs 20 per ounce. A good deal of musk is brought from Kulu and native Garwahl to Rampur.</p>	<p>COMMERCIAL FORMS</p>
<p>Indian Trade in Musk—The extent of the internal trade in musk cannot be discovered but as the animal is systematically hunted all over the region where it occurs and the so-called musk pods are to be had in every drug seller's shop the consumption must be very extensive.</p> <p>Mr Baden Powell says that about 100 musk bags are imported from Chang Shan <i>via</i> Yarkand of which about 40 go to Yarkand the rest to Kashmir and Jammu and are taken by Yarkandi pilgrims to Mecca or for sale in India and other Asiatic countries. They are produced in the north west of Rodokh and Nepal value at Leh Rs 7 to 15 or at Yarkand from Rs 21 to 26. In former times musk bags from the Dasht-i-Khattan or Great Tartar desert were in high repute and fetched at the least Rs 42 but all supply from that quarter has long ceased. In many of the reports of external (or trans-frontier) land trade mention is made of musk but not in such a manner as to allow of a trustworthy statement being compiled of the total imports in any one year. Indeed the animal is so very generally found throughout immense portions of the British Indian Himalaya (the produce of which would not appear in reports of trans frontier imports) that even a compilation from all the reports on Indian foreign trade by land would by no means convey a definite conception of the total trade. The imports of musk into Bengal from Sikkim and Tibet were valued in 1883 Rs 4 at Rs 2,563 in 1884 Rs 100 and in 1885 Rs 265. During the same periods Bengal received from Bhutan musk to the value of Rs 913 Rs 344 and Rs 624. During the last of these years (1885-86) it also obtained from Nepal musk to the value of Rs 235, so that by these foreign sources alone India obtained Rs 67124 worth of musk and the previous year the imports appear to have been considerably larger. The Assam imports, not consumed in the province must be also carried into Bengal and be distributed from Calcutta all over the country and doubtless also a very considerable amount of the imports into the North West Provinces and the Panjab find their way to Calcutta. But as stated an elaborate compilation from all the Trans frontier Land Trade Reports, Railway and River borne Trade, and of all other such sources of information,</p>	<p>TRADE. 235</p>

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The Musk Deer, the Swamp Deer

TRADE

would fall short of the actual mark since a small expensive article like that of musk must be extensively trafficked in outside the limits of possible commercial statistics Calcutta is however the chief emporium of the trade, and some conception of its total extent may be gathered from the figures of Foreign Exports by Sea from India which it may be repeated represent the surplus over and above Indian consumption Last year (1887-88) India exported 2 144 ounces valued at R72 116 and of that amount only R20 worth left Bombay the rest being exported from Bengal and R61 220 worth were consigned to the United Kingdom The exports in 1886-87 were valued at R70 913 the smallest amount since 1878-79 The average exports for the past ten years may be taken to have been valued at R11 750 The total amount of musk exported from India during these years was 44,195 ounces, valued at R11 7519. Each animal contains only one musk pod the average weight of which is about one ounce of musk so that the above figures would represent an annual slaughter of about 4 500 male animals to obtain the musk exported from India These are of course not all killed within British territory the traders bring a large proportion from the regions on the north of the Himalayas But on the other hand the internal or Indian consumption is not estimated for so that it is probable the Indian trade (internal and exported) represents a slaughter of little short of 10 000 musk-deer annually And doubtless a large number of females are caught in the snares by which the natives capture the animal so that it is probable that nearly 20 000 are actually killed by the traders and sportsmen combined This wholesale extermination doubtless has something to say to the visible decline in the supply and to the decrease in the exports but it is also probable that other animal and even vegetable sources of supply are yearly coming into greater importance

The value of the musk pod is said to average from R10 to R15 For further particulars in continuation with this account of the Perfume musk see **Musk** in another volume in which will be found the medicinal and chemical properties of the substance and its applications in the art of perfumery together with information regarding the other sources of supply

Skin — The skin of the musk-deer does not appear to be of any value It is covered with rigid porcupine like hairs

Food — The flesh of the young animal is reported to be tender and well flavoured The female does not produce musk but even in the male while the animal smells strongly and the dung also is musk scented the flesh is perfectly devoid of the odour not even the stomach nor the contents of the stomach removed after death, partake of the characteristic smell

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FOOD
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Rucervus Duvancellu (Jerdon, Mam., 254)

THE SWAMP DEER

Vern — *Bara singha* HIND *Baraya* or *maha* NEPAL TARAI *Jhinkar* KYARDA DOON *Potiya haran*, MONGHYR *Goen* or *goenjak* (male) *gaoni* (female) CENTRAL INDIA

Habitat — The forest lands at the foot of the Himalaya from Kyarda Doon to Bhotan It is very abundant in Assam inhabiting the churs and islands of the Brahmaputra down to the Sunderbunds It also occurs at Monghyr and extends sparingly to Central India It lives in great herds, preferring the open forest land in the vicinity of rivers According to **Major Ward** it is common in Nepal and is still to be found on the banks of the Sardah river and the islands intersecting its course near Moondea Ghât in which neighbourhood he has shot several **Major Ward** adds that years ago it used to be found in the Dehra Duns but that none are at

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The Eld s Deer, the Samber Stag (G Watt) DELPHINIDÆ.

present met with in those parts except considerably to the westward of Philibeet

Rucervus Eldi (Jerdon, *Mam*, 255)

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THE MANIPUR OR BURMA STAG, THE BROW ANTLERED OR ELD S DEER

Vern — *Thamin* BURM *Sungrai* or *sungnai* MANIPUR

Habitat — The Eastern Himálayas Manipur Burma Siam and the Malay Peninsula It is essentially a plains loving species and though it frequents open tree jungle it never ventures into dense tangled brushwoods, and on being alarmed takes to the open

Rusa Aristotalis (Jerdon, *Mam*, 256)

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THE SAMBER STAG

Vern — *Sambar*, HIND, *Jeras*, *jerao* in the HIMALAYA *Maha* in the TARAI *Meru* or *Kadavi* MAR *Kadivi* BELGAUM *Maoo* GOND *Kannadi* *TELEGU* *Ghous gaoj* EASTERN BENGAL *Schap* BURM

References — *The account given in the Gazetteer of Kanara District will be found interesting p 100*

Habitat — Throughout India from the Himálaya to Cape Comorin and through Assam and Burma to the Malay Peninsula and Ceylon In the *Kanara Gazetteer* it is said of that district that the Samber is nowhere so numerous as it was ten or fifteen years ago The cause of this is said to be the great increase of guns There is scarcely a village that has not its gun or guns licensed or unlicensed The practical extermination of the animal in Kanara is feared likely to soon occur

Skin and Antlers — Major Ward communicates the following note — 'Hide greatly in demand in India A hind s skin will now sell for R3 to R4 and when tanned for R7 to R10 Used for gaiters boots bags &c If dressed well with a mixture of linseed oil and mutton fat it will stand wet fairly well but if not so dressed it hardens on drying'

Skin.
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Food — The flesh of the Samber is rather coarse and rarely fat but sometimes well tasted The marrow bones and tongue are saleable In Kanara the natives sit on the wild fruit trees and shoot the samber when it comes to feed or they lie in holes dug near tanks of water The fruits on which it specially feeds are said to be *Phyllanthus Emblica*, *Dillenia pentagyna*, *Terminalia bellerica*, and *Spondias mangifera*.

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DELIMA, Linn, *Gen Pl*, I 12

Delima sarmentosa, Linn *Fl Br Ind*, I, 31 DILLENIACEÆ

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Syn — *TETRACERA SARMENTOSA* Willd

Vern — *Mon kyourik* LEPCHA *Korasa wel* SINGH

References — *Roxb Fl Ind Ed C B C 449 Kurz For Fl Burm I 22; Gamble Man Timb 2 Thwaites En Ceylon Pl 2; Gamble List of Trees and Shrubs &c of Darjeeling p 2 Royle, Ill Hm Bot 58; Balfour, Cyclop 910 Treasury of Bot 390*

Habitat — A woody climber met with in Eastern Tropical India from Darjeeling and Assam to Singapore Kurz says it is frequent in the mixed forests of Burma from Chittagong and Pegu down to the Andamans also in Ava

Domestic Uses — The leaves of the plant are universally employed in the countries where the plant occurs, in place of sand paper to polish wood and even metal articles

DOMESTIC
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Delphinidæ, the Whale family, see **Whale**.

**DELPHINIUM
Brunonianum****The Larkspur****DELPHINIUM, Linn , Gen Pl , I , 9, 953**

A genus of annual or perennial herbs containing some 40 species which are distributed throughout the north temperate zone and on the temperate tracts of lofty mountains in the southern zone. The generic name derived from the Greek *Delphinion* arose from the somewhat fanciful resemblance of the flower bud to the head of the Dolphin and the English name Larkspur was doubtless occasioned through the long spur like prolongation at the base of the flower. The common Larkspur *Delphinium Ajacis* takes its specific botanical name from the supposition of its petals denoting the letters, A I A the initials of Ajax the Greek Trojan hero. The Larkspur is a favourite garden annual in India. On the Himalaya it shows a distinct desire to leave the restricting influence of cultivation and even in some parts of the plains manifests a tendency to become perennial. Withstanding the intense summer's heat of the drier areas it may sometimes be seen to flower during winter and spring for several successive seasons. In such cases however it assumes a rigid bushy habit and has small pale coloured flowers. In fact it alters its faces so far as to largely lose its accepted specific characteristics and assumes some of those of *D orientale*. Firminger remarks that he had failed completely to germinate imported Larkspur seed in the plains of India. The plant must be first acclimatised in the temperate regions of India and be brought gradually down to the plains. The stock found in the plains consists of *D Ajacis* and *D consolidida*. The latter having larger flowers on longer peduncles and the segments of the leaves broader than the former. Firminger speaks of both collectively as a poor weedy worthless thing. In a further passage he concludes — If the ground where Larkspurs have grown one season be left undisturbed an abundant crop of self sown plants will spring up the following November and December. In Bankipur (Behar) the writer carefully marked several individual plants and found that they continued to grow throughout the year and even formed flowers during the hottest months provided they were watered and had the partial shade from trees. In the same way a crop of lettuce was obtained at any season and both Larkspur and lettuce produced from self sowings the stock of seedlings for almost any month of the year. The Larkspur was thus acclimatised to one of India's dry hot tropical climates and had practically lost its character as a temperate loving plant. In most parts of India (preferentially the dry or non inundated areas) it is practically a cold season garden weed its single faded purplish flowers being unworthy of care and attention.

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[LACEÆ

Delphinium Brunonianum, Royle Fl Br Ind I, 27, RANUNCU-

Vern — Nepari KUMAON *Kasturi* GHARWAL *Sappalu* (RAVI) *laskar*
spet panni supalu ruskar lohpa (SUTLEJ) PB *Ládara* LADAKH,
Laskara SIMLA *Mundwal* PANGI

References — *Stewart Pb Pl 3 Aitchison Kuram Valley Flora (Four*
Linn Soc XVIII pp 25 30) Atkinson Him Dist 412 735 Royle
III Him Bot 56 Balfour Cyclop I 911 Gazetteer Simla Dist p 12

Habitat — A very abundant plant on the higher Western Himalaya and Tibet at altitudes of 13 000 to 17 000 feet

MEDICINE
Juice
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Leaves
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Medicine — This plant is prized for its strong scent of musk. It is offered to the presiding idol of the hill temples. Aitchison in his *Flora of the Kuram Valley* remarks that the juice of the leaves of this plant are used in Kuram to destroy ticks in animals but chiefly when they affect sheep. This is a curious fact pointing to *Stavesacre (D Staphisagria, Linn)*, which is now very largely used in Europe and was employed both by the Greeks and Romans for a similar purpose, viz the destruction of vermin.

SPECIAL OPINIONS — § In Leh it is considered so poisonous that the dew from the leaves falling on grass is said to poison cattle and horses" (*Surgeon Major J E T Aitchison, Simla*)

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The Nurbisi or Jadwar	(G Watt)	DELPHINIUM denudatum
Perfumery —Used as a substitute for Musk (which see) Atkinson (<i>Him Dist</i> p 735) says it is exported from the Kumaon Himálaya on account of its musk scented leaves		PERFUMERY 248
Delphinium cœruleum , Jacq, <i>Fl Br Ind</i> , I 25		249
Vern —Dakhangu Pb		
References —Stewart Pb Pl 3 Atkinson <i>Him Dist</i> 328 412		
Habitat —A slender plant with light blue flowers met with on the alpine Himalayas common in the Sutlej basin from 8 000 to 17 000 feet		
Medicine —The root is applied to kill the maggots in the wounds of goats (Stewart)		MEDICINE Root 250 251
D cashmirianum , Royle <i>Fl Br Ind</i> I 26		
Vern —Amlin (in RAVI BASIN) Pb		
Habitat —An alpine herb met with in the Western Himálaya Kashmír and Thibet at altitudes of 10 000 to 16 000 feet		
Medicine —Stewart says this is strongly scented like D Brunonianum Atkinson (<i>Him Districts</i> p 745) alluding to the necessity of a thorough investigation of the roots, &c exported from the hills under the names of <i>bikh</i> and <i>nirbisi</i> after mentioning <i>Pæonia Emodi</i> , <i>Aconitum ferox</i> , <i>Polygonatum verticillatum</i> , and <i>Smilacina pallida</i> , adds The cylindrical tuberous roots of <i>Delphinium kashmerianum</i> , Royle found at Pindari in Kumaon and Bhojgara on the south side of the Kawi pass in Garwahl (11 000 to 14 000 feet) are absolutely identical with the ordinary <i>nirbisi</i> roots (See Madden <i>An Hag N H 2nd Ser XVIII</i> 445) Conf with D denudatum		MEDICINE 252
D denudatum , Wall <i>Fl Br Ind</i> I 25		253
Syn —DELPHINIUM PAUCIFLORUM Royle (not of Don)		
Vern — <i>Nirbisi</i> (according to Dymock) <i>judwar</i> (according to Murray) HIND <i>Nilo bikh</i> NEPAL <i>Nirbisi</i> (of the BHOTIAS) EAST HIMALAYA <i>Munila</i> (SIMLA) PB <i>Jadwar mahferfin</i> (according to Dymock) ARAB		
Compare the above vernacular names with the remarks under Curcuma aromatica , Vol II, p 656		
References —Stewart Pb Pl 3 Dymock <i>Mat Med W Ind 2nd Ed</i> 11 Murray <i>Pl and Drugs Sind</i> 74 Royle <i>Ill Him Bot</i> 55		
Habitat —An annual herbaceous plant common on the outer ranges of the Western Himálaya from Kashmir to Kumaon altitude from 5 500 to 8 500 feet A denizen of the drier warm temperate tracts of the Himálaya especially on grassy slopes where occasional brushwood occurs on southern exposures (Conf with D vestitum)		
Medicine —Only one modern author records the observation that the natives of India use this <i>Delphinium</i> medicinally—Madden wrote that the root is chewed on Sundays by the people of Bashahr for tooth ache It would appear to be one of the roots occasionally collected in order to be used as an adulterant for Aconite The trade in the article is, however extremely limited and naturally so since it nowhere grows in the region where the Aconites are found It bears the name of <i>Nirbisi</i> with the Bhotias of Nepal and on this account alone it would appear to have been lagged into the controversy as to the root which should be accepted as the <i>Nirbisi</i> (or rather <i>nir-visha</i>) of Sanskrit writers and the <i>Jadwar</i> of the Arabic Dr F Hamilton was the first to make known the existence in Nepal of various species of <i>Aconitum</i> These he incorrectly assigned to the genus <i>Caltha</i> , but gave useful information regarding their		MEDICINE Root 254

**DELPHINIUM
denudatum****The Nirbisi or Jadwar****MEDICINE****Singya bikh****255****Bikh****256****Bikhma****257****Nirbisi****258****Jadwar****259**

poisonous properties. He described four forms—(1) *Singya bikh* (2) *Bish* or *bikh* (3) *Bikhma* and (4) *Nirbisi*. *Bikhma* he explained was a powerful bitter and Wallich subsequently identified this as *Aconitum palmatum*. *Nirbisi* Hamilton affirmed to be devoid of poisonous property while he announced *Singya* to be the root of a *Smilax* and *Bish* or *Bikh* to be a violent poison. More recent writers have extended the list of vernacular names given to the poisonous Aconites. Thus *Singvi* or *Singya bish* (the horny bis) and *mitha sahar* (the sweet poison) are given to two forms of *Aconitum ferox*, the separate properties of which are recognised by the Indian drug sellers. Both Hindu and Muhammadan writers on *Materia Medica* refer to many forms of poisonous and non poisonous aconites. Some of the former are so poisonous as to have obtained the fabulous reputation of proving fatal to the touch. Of the latter many forms are mentioned the names given expanding until they include an extensive series of tonic medicines many of which are in no way related to *Aconitum*. In a like manner the word *Bish* or *Bikh* simply means poison the *lisha* of Sanskrit but it became specifically restricted as a proper name to Aconite the most poisonous of all the poisons—*Bikh* or *Bis* the poison. So also *Bikhma* or *Bishma* would mean *bikh* like and might be supposed to have been first applied to the less poisonous forms of Aconite until in the descending scale of transitions the innocuous forms of Aconite were embraced by it and in time also the root or collection of roots that ultimately received the designation of *Nirbisi* with its synonyms in Arabic of *Jadwar* and *Mahfirfin* and in Persian of *Zadwar*. Whether or not the word *Nirbisi* means antidote if a synonym for *Jadwar* the root referred to must have been used as a drug to strengthen the system against poison—the alexipharmic of ancient writers. Royle wrote—The term *Nirbisi* as observed by Mr Colebrooke implies that the drug is used as an antidote to poison being composed of the privative preposition *nir* and *bis* poison and in the *Makhzan ul Adwiyat* it is further explained as repelling from and purifying the body from poison. Commenting on the above opinion held by Mir Muhammad Husain Dr Dymock says—

The Indian name *Nirbisi* he (Mir Muhammad) explains incorrectly as *Nir* the antidote to *Bish* the poison. *Nirvisha* is a Sanskrit adjective meaning not poisonous and *nirvisha* or *nirvishi* is never applied to Aconite by Hindu medicine writers but denotes a peculiar sedge used as an antidote to certain poisons viz *Kyllingia monocephala* Linn. According to most writers the *Jadwar* possesses alexipharmic properties and Dr Moodeen Sheriff says—*Jadwar* is the only safe word to use in ordering the non poisonous aconites. He however remarks *Nirbisi* is often confounded with the Sanskrit name *nirvisha* and this is partly from the partial analogy that exists between their pronunciation and partly from their literal and general meaning being nearly the same. *Free from or without poison* is the literal meaning of *Nirvisham* or *Nirvisha* and the meaning generally attached to it in books is an *antidote*. The only difference between the above meaning and the meaning of *Nirbisi* is that the Sanskrit word *lisham* or *Visha* is the common name for any poison whatever it may be while *bis* in Hindustani is the name of a particular vegetable poison viz the root of *Aconitum ferox*.

An antidote to Aconite poison would be a diffusible stimulant and thus as time went on discovery after discovery would doubtless have expanded the list of drugs that might each deserve the name of *Nirbisi* or *Jadwar*. It may thus be safely assumed that every region and age had its favourite *Nirbisi* and that special preparations of certain diffusible stimulants came to take the place of some particular root—the *Nirbisi* of the earlier authors. The writer had a sample of the sacred

The Nurbisi or Jadwar

(G Watt)

DELPHINIUM
denudatum

Costus root (the root of *Saussurea Lappa*) sent him from Assam as the antidote used by the Akas against Aconite poison. This fact is of considerable interest as manifesting a knowledge in the properties of a Kashmir diffusible stimulant which perhaps far surpasses in its efficacy all the indigenous antidotes met with in the Aka country. It must therefore be either carried from the one extremity of the Himalayas to the other passing from village to village and hand to hand over a wild mountainous country of perhaps several thousand miles or be imported into the highland home of the savage Aka from the plains of India. But the interest in this incident namely the knowledge of the properties of a drug does not rest here. The Akas do not import their Aconite. They possess an indigenous species quite as virulent as the Nepal root which finds its way all over Asia. The Akas recognise in the supposed cure the identity of the poison and we have thus a flood of light thrown on the subject of the *Bikk Bikhma* and *Nurbisi* of the ancient Sanskrit writers which justifies the caution that a too literal interpretation or application of these words assigning them to this individual species and that may miss the mark and only multiply ambiguity with the obscurity of antiquity. This caution is rendered all the more forcible when it is added that botanists have established the fact that under *Aconitum ferox* and *A. Napellus*—the most poisonous species of Aconite—there are forms known to the shepherds of the higher Himalaya which like *Aconitum heterophyllum* may be eaten with impunity or used as tonic or anti-periodic medicines. The *Makhsan el Adwiyah* states that the only plant that can grow near the *Bikk* is the *Jadwar*. This may be a mere tradition but if it be accepted as carrying any meaning with it all idea of the *Jadwar* being *Zedoary* would have to be completely set aside. Dr Moodeen Sheriff indeed urges that much unnecessary ambiguity has been caused through an early error of regarding the word *Zedoary* as derived from *jadwar* and *sadwar*. The Sanskrit scholar the late Mr Colebrooke identified *nurbisi jadwar* and *sadwar* as synonymous terms and suggested that these were most probably given to a species of *Curcuma*, but he added if this be not so they would have to be collectively assigned to the root of some other plant. Ainslie contended that the *nurbisi* of Dr Hamilton must not be confounded with the word *nurbisi* which is the Sanskrit for *Curcuma Zedoaria*. Dr Dymock and many other modern writers however assign these classical names to *Delphinium denudatum* not because of the roots of that plant agreeing with the descriptions given by early authors or of their being used (at the present day) or known to possess the property of an antidote to poison but because the hill tribes on a restricted portion of the Himalaya are stated to give it the local name of *Nurbisi*. The writer suggested to Dr Gimlette Residency Surgeon Nepal the desirability of his instituting certain enquiries into the subject of the Nepal Aconites. As the result samples of a number of plants and roots together with their vernacular names and notes as to uses were communicated. The *Kala bikk* of the Nepalese for example (the *Dulingi* of the Bhotias who make a trade in collecting and selling these roots) was reported to be a very poisonous form of *Aconitum ferox* so poisonous indeed that the Katmandu drug sellers will not admit they possess any *Pahlo* (yellow) *bikk* a less poisonous form of the same plant known to the Bhotias as *Holungi* while *Setho* (white) *bikk* (the *Nurbisi sen* of the Bhotias) was *A. Napellus* and *Atis A. heterophyllum*. The Aconite adulterants or plants used for similar purposes were found to be *Cynanthus lobatus* the true *Nurbisi* of Nepal the root of which is boiled in oil thus forming a liniment which is employed in chronic rheumatism. *Delphinium desu*

Kala bikk.
260Pahlo bikk.
261Setho bikk
262Adulterants
263

**DELPHINIUM
denudatum****The Nirbisi or Jadwar****MEDICINE**

Nilo bikh
264
Ratho bikh
265

Munila.
266

datum the *Nilo* (blue) *bikh* of the Nepalese and the *Nirbisi* of the Bhotias **Dr Gimlette** reported to be used by the *Baids* of Nepal for the same purposes as the *Setho* and *Pahlo bikh* **Geranium collinum** (*var* **Donianum**) was found to be the *Ratho* (red) *bikh* of the Nepalese and the *Nirbisi num* of the Bhotias and like the *Setho bikh* was stated to be given as a tonic in dyspepsia fevers and asthma. Lastly a plant never before recorded as used medicinally namely **Caragana crassicaulis**, was sent to the writer under the name of *Artiras* of the Nepalese and the *Kurti* of the Bhotias it was reported to afford a root employed as a febrifuge. The Nepalese name *Artiras* may be admitted as recalling *Atis* (**Aconitum heterophyllum**) and the Bhotia *Kurti* as bringing to mind *kutki* (**Picrorhiza Kurroa**) two drugs which like *Nilo bikh* (or *Nirbisi*) and the *Setho* or *Pahlo bikh* are employed as tonics and anti periodics (*Conf* with **Coptis Teeta**, Vol II, No 1792 p 522).

Delphinium denudatum inhabits the southern warmer slopes of the Himalaya descending to lower levels than any of the aconites though in its higher areas it becomes intermixed with **Aconitum heterophyllum**. Around Simla and extending into Kumáon and Kullu it is known as *munila* but it neither bears the name of *nirbisi* nor has assigned to it any medicinal properties. It would not be difficult to suppose that if the original *nirbisi* or *nirvisha* (for the difference may after all be but the result of modern specialisation) was obtained from the Himalayas and was also known as the *jadwar* it may have been some of the tonic and febrifugal roots already alluded to if it be not as **Moodeen Sheriff** thinks the non poisonous forms of aconite. This supposition would give meaning to **Father Ange's** statement (in the *Persian Pharmacopæia* published 1681) that the root though poisonous when fresh was perfectly innocuous when dried and that when mixed with food and condiments it acted as a restorative. The *nirbisi* of the plains of India—the rhizomes of **Kyllingia monocephala**—may have come to be so called from their resemblance to Zedoary the *Jadwar* of some writers. In pursuing such an opinion one might be almost pardoned the speculation that in the earlier ages of medical knowledge the strength giving bitter roots would have been likely to attract attention and to obtain a high reputation long before the less evident and more hypothetical remedies of modern times became known. Since these tonics abound in the higher temperate regions of Asia they would likely enough have continued with the migrations of the people southwards to be carried all over the fever stricken plains that possess but few good tonic and febrifugal drugs. The property of an antidote to poison if ever assigned to these drugs might fairly well have depended upon their tonic action in strengthening the system against the effect of poison. The literature of *Nirbisi* is not so complete as that of *Jadwar* but accepting the usual assumption as correct that these are mere synonyms the present review of this subject may be concluded with a reference to the writings of Muhammadan physicians on *Jadwar*. Under that drug **Mir Muhammad Husain** mentions *Antila* as its Arabic name and *Saturys* as its Greek. **Dioscorides** refers to two forms of the aphrodisiacal drug *σαρρυιον* but both these are most probably the saleep tubers which in consequence of the superstitious doctrine of signatures have for ages enjoyed in Asiatic countries the reputation of being stimulants to the generative organs. Muhammadan writers allude to saleep under the name of *Khusyu uth thaalab* (Foxes testicles) and the odour of the fresh root is said to resemble that of semen. Saleep has in India the reputation of being a nerve restorative and aphrodisiac. Here then we have another link between the early *nirbisi* and the more recent Zedoary which might serve to connect the rhizomes of the medicinal sedges **Kyllingia monocephala** and **Cyperus rotundus**. But

The Nurbisi or Jadwar

(G Witt)

DELPHINIUM
vestitum

Mir Muhammad Husain mentions five kinds of *Jadwar* the first and most valuable of all—the *Khatai*—is said to be black externally purplish brown internally and knotted. It tastes sweetish at first but is afterwards very bitter (P *Cyperus*). The second and third come from Tibet Nepal Rungpore &c. The fourth is said to be blackish to be very bitter and of the size of an olive it is reported to come from the Deccan hills and thus can be neither a *Delphinium* nor an *Aconitum*. The fifth is the Spanish drug known as *Antila*. Dr. Moodeen Sheriff states that there are in the bazars of South India three kinds of *Jadwar* all in his opinion non poisonous aconites.

The writer does not venture to suggest what each of Mir Muhammad's forms of *Jadwar* may have been but he accepts the general inference from Mir Muhammad's account as confirmatory of the views already expressed namely that it would be unsafe to regard *Nurbisi* and *Jadwar* as more than ancient names for a drug or drugs which with the extinction of the Arabian school of medicine lost any specific signification they ever possessed (The reader is referred to *Aconitum* Vol I p 84 to *Curcuma* Vol II, p 656 and also to *Bombax* *Eulophia*, and *Saleep*.)

MEDICINE

Delphinium sanciculæfolium, Boiss Fl Br Ind, I 25

267

Habitat—An erect herbaceous rigidly branched plant met with in the Western Himálayas frequenting dry hills from the Indus to the Jhelum and distributed to Afghanistan. Racemes long composed of many pale blue flowers each less than half an inch in size.

History—It has been customary to read in works on Indian Economic Products that from this plant is obtained the dye and medicinal flowers known as *asbarg*. The writer had occasion to examine a large sample of these flowers and twigs in connection with the preparation of the collections for the Colonial and Indian Exhibition. It was then noted that the *asbarg* flowers would not answer to the description given by botanists for *D sanciculæfolium* and that as a ready eye mark the *asbarg* flowers were clearly yellow instead of blue when fresh. At that time the enquiry was carried very little further but Dr Stewart's description was consulted when it appeared subsequent authors had disregarded the doubt indicated by the qualification perhaps. Stewart's words are a considerable import takes place from Afghanistan into the Panjab in the flowers of perhaps the species named (*D sanciculæfolium*). Then again Mr Edgeworth first brought this substance to notice many years ago and supposed these were the flowers of *D altissimum* Wall but it does not appear to grow so far west. The writer has had the pleasure to examine a plant collected by Dr Aitchison in Afghanistan (*D Zalil Aitch and Hemsl*) and to compare it with the *asbarg* flowers sold by Indian drug sellers. As the final result he has no hesitation in affirming that the economic facts given by all Indian writers under *D sanciculæfolium* should be carried to *D Zalil* (Conf with that species below.)

HISTORY
268*D vestitum*, Wall Fl Br Ind, I 26

269

Vern.—*Ṣuhí* SIMLA

Habitat—West and Central Himálayas at altitudes from 8000 to 12000 feet. In the lower portion of its region it occurs sparingly in mixed forests is a coarse plant attaining a height of 3 to 4 feet and has large deeply lobed sharply serrate leaves and a spike of dirty purplish blue flowers. On the higher area where it is met with on exposed grassy hills it is extremely abundant miles of country being covered with it along with *Achillea millefolium* *Tanacetum longifolia*, &c. It is here more stunted

D 269

DELPHINIUM
Zalil**The Asbarg****MEDICINE****Leaves**
270

approaching the type of **D Brunonianum** and **D cashmirianum**. Has roundish leaves 5-9 lobed and almost dentate instead of serrate. Flowers larger than those of the lower altitude opening up more pronouncedly and pale blue coloured. This plant commences to appear where **D denudatum** disappears and ascends to the altitude where **D cashmerianum** and **D Brunonianum** occur.

Medicine—On questioning hill people who were found collecting **Jurinea macropcephala** (the roots of which are used as incense under the name of *dhuṣ*) and also the medicinal rhizomes of **Picrorhiza Kurroa** as to any uses of the roots of this **Delphinium** the writer was informed that they were not collected nor were they known to possess any medicinal virtues. The leaves were said however to be poisonous to goats. Neither the leaves nor flowers have the musk odour of **D Brunonianum**. This negative information is alluded to here in consequence of the writer's conviction that authors who attribute medicinal properties to **D denudatum** are most probably in error. If any **Delphinium** was a regular article of trade (medicinally) the present species might be expected to be so far rather than the scarcer plant **D denudatum** which at most (though widely distributed at altitudes between 5000 and 8000 feet) occurs only here and there and yields a small inert root.

271

Delphinium Zalil *Aitch et Hemsl., Botany of the Afghan Delimitation Commission published in the Trans Linn Soc (2nd series) Vol III 20 30*

Vern—**Asbarg** HIND. **Asbarg** (the dye) and *ghafis* (the medicine) PB
Zalil KHORASAN *Trayaman gulzail* BOMB. *Asfrak asperag traya*
man PERS. *Zarir* ARAB.

Habitat—A perennial plant throwing up a spike of bright yellow flowers two feet in height. Dr Aitchison says of it: "This plant forms a great portion of the herbage of the rolling downs of the Badghis in the vicinity of Gulran it was in great abundance and when in blossom gave a wondrous golden hue to the pastures in many localities in Khorasan about 3000 feet altitude it is equally common." At another place he alludes to it again as with its showy blossoms covering the downs which they illuminate with their brilliant colouring affording a sight never to be forgotten.

DYE
272

Dye—The dried flowers and fragments of flowering stems are brought from Afghanistan to Multan and other Panjāb towns from which they are conveyed all over India. In Multan as in most other places they are used along with *Akalber* (*Datisca cannabina*) and alum for dye silk a yellow colour. Sir E. O. Buck in his *Dyes and Tans of the North Western Provinces* says of **Asbarg**: "A yellow dye extracted from the stalks and flowers of a species of **Delphinium**. The flowers and stalks are imported into these provinces from Kabul and Khorasan to the Panjāb. A decoction made from them is much used in silk dyeing giving the sulphur yellow colour known as *gan thak*. It is also used in calico-printing. Its price is Rs 27.5 per cwt. This dye is also alluded to by Mr Liotard by Dr McCann and by Mr Wardle but under the name of **D Ajacis**."

MEDICINE
Flowers
273

Medicine—The flowers are bitter and are said to be used medicinally as a febrifuge. Dr Dymock publishes the following early account of the drug being a translation from the *Makhsan el Adwiyā*. *Zarir* grows in the Khorjān hills and is called *Asfrak* by the people of Shirāj and *Arjikan* by the Greeks. The stem is about a span high flowers yellow like those of *Asfaris barri* surrounded by a few soft prickles leaves yellowish small root more than a span long. *Asfrak* is cold and dry, with slight

D 273

Bamboos

(G Watt)

DENDROCALAMUS
Hamiltonii

heating properties also detergent anodyne and diuretic; it is useful in spleen jaundice and dropsy mixed with barley meal it forms a poultice which is of much service in inflammatory swellings; its ashes are useful in itch maximum dose 5 dirhems' (240 grains 24 hours in decoction) it is also used as a yellow dye The reference to its use in itch is interesting as showing a similar property to that of the European plant known as Stavesacre (*Delphinium Staphisagria*, Linn) (Conf with the remarks regarding the medical uses of *D Brunonianum*, p 64)

MEDICINE

DENDROCALAMUS, Reed Gen Pl III 1212

A genus of bamboo or arlorescent grasses distinguished from *BAMBUSA* by the pericarp of the fruit being coriaceous or hard and by the flowers having six instead of three stamens (Conf with *Bambuseæ* Vol I No 69 page 371) Very little of a definite nature can be written regarding the individual properties of the species of *DENDROCALAMUS* All are of course used by the people in the localities where they occur and like those of *Bambusa* are collectively designated Bamboo (Conf with the *Economic Uses of Bamboo* Vol I p 387)

Dendrocalamus Brandisii, Kurz GRAMINEÆ

274

Syn — For *BAMBUSA BRANDISII* Munro See Vol I p 391

D calostachyus, Kurz For Fl II 62

275

Habitat — Ava at Bhamo and on the Kakhyen hills east of it at 3500 feet elevation (Kurz)

D criticus, Kurz

276

Habitat — Found in Pegu altitude 3000 feet stems 15 to 30 feet Kurz says that it is apparently restricted to the shady side of the summit of the Kambalatoung Prome Yomah

D giganteus, Munro

277

Syn — *BAMBUSUS GIGANTEA* Wall

Vern — *Wakli waya* BURM

References — Gamble Man Timb 430 Mueller Sel Extra Trop Pl (7th Ed) 132 Spons Encyclop 921 Balfour Cyclop 914 Kew Off Guide to Bot Gardens and Arb retum 41

Habitat — Met with in Tenasserim stems attaining a height of 100 feet and often 26 inches in girth

This is one of the largest (indeed next to *Bambusa Brandisii* the largest) of bamboos It is much used in Burma for POSTS and RAFTERS in rural house-building

DOMESTIC
POSTS.

278

RAFTERS.

279

280

D Griffithianus, Kurz For Fl Burm II 563

Syn — *BAMBUSA GRIFFITHIANA* Munro

Habitat — Ava

281

D Hamiltonii, Nees

Vern. — *Kokwa* BENG *Tama* NEPAL *Pao* LEPCHA *Wah* MICHU *Wahnok* GARO *Pa-shing* BHOTIA

References — Brandis For Fl 570 Gamble Man Timb 430; Hooker *Himalayan Journal* I 155 *Indian Forester* I 221 226 VII 49 VIII 293 XIII 522 XIV 112 114; Mueller *Select Ext Trop Pl* 7th Ed 132 Balfour Cyclop 914

Habitat — A common bamboo in the Eastern Himalaya from Kumaon to Assam Generally a tall grass 40 to 60 feet in height, but sometimes found as a long and tangled bush

D 281

**DENDROCALAMUS
strictus****The Male Bamboo****FOOD
SHOOTS
282****TIMBER
283**

Food —The young **shoots** are boiled and eaten in Sikkim Bhutan and Assam

Structure of the Wood —The halms are large 3 to 6 inches diameter rather hollow and not always straight but they are used for every variety of purpose. The bamboo grows gregariously on hill sides up to 3 000 feet and the stems are 40 to 60 feet high. They frequently grow low and tangled instead of straight indeed this bamboo may at times be recognised by this character and by the very thick shoots which grow out at the nodes (*Gamble*)

Mr F B Manson in an article in the *Indian Forester* alludes to the utility of this bamboo to the tea planter in shading his estate from hot and violent winds. He then refers to the discussion as to its flowering. I have noticed he remarks that the forest bamboo of the Terai is flowering pretty generally this year (1882) but the phenomenon does not universally affect all bamboos. I have also noticed clumps of this bamboo in a languishing condition which had lately flowered. **Hooker** in his *Himalayan Journal* says it flowers every year which is not the case with all others of this genus most of them flower profusely over large tracts of country once in a great many years and then die away

284**Dendrocalamus Hookeri, Munro**

Vern —*Ussey assey denga ukotang* Ass

Reference —*Brandis For Fl* 570

Habitat —An allied species to **D Hamiltonii** but with larger leaves (15 inches long and 3 4 inches broad) met with in the Eastern Himalayas Assam and the Khásia hills

**TIMBER
285**

Structure of the Wood —Stems 50 feet in height and like the other species put to many useful purposes

286**D longispathus, Kurz For Fl Burm II 561**

Vern —*Wa ya* BURM

Habitat —Frequent along the *chongs* in the moister upper mixed forests and also in the tropical forests of Arracan Pegu and Martaban (*Kurz*)

**TIMBER
287
288**

Structure of the Wood —Stems from 40 to 60 feet in height

D membranaceus, Munro

Vern —*Wa ya* BURM

Habitat —A native of Burma

Structure of the Wood —Stems 40 to 50 feet

**TIMBER
289
290****D Parishii, Munro**

Habitat —**Brandis** remarks that this species is described from specimens said to have been collected in the Panjáb Himálaya. It is closely allied to **D Hamiltonii**, differing in its ovate lanceolate acute spikelets

291**D serviceus, Munro**

Habitat —Found on Parasnath Chutia Nagpur

292**D strictus, Nees****THE MALE BAMBOO**

Syn —*BAMBUSA STRICTA Roxb*

Vern —*Báns bans kaban bans khárd kopar* HIND *Karail* BENG *Mathan saring burumot* KOL *Buru mat* SANTAL; *Bukhar* (for the Clump) PALAMOW *Halpa veddar vadur* GOND *Bhur* BAIGAS

D 292

The Male Bamboo (G Watt)

DENDROCALAMUS
strictus

Bas udha (kaban bassa or vassa Lisboa) BOMB *Bhowarlit* MAR
Kark PANDRATOLA Kanka sidhanapu venduru (Elliot) TEL *Myn*
na BURM

References — Roxb *Fl Ind* Ed C B C 304 Voigt *Hort Sub Cal*
718 Brandt *For Fl* 569 Beldome *Fl Sylv* 235 t 325 Gamble
Man Timb 430 Stewart *Pb Pl* 71 Aitchison *Cat Ib and Sind*
Pl 171 *Flora Andur* by Sir W Elliot 165 Mueller *Select Extra Trop*
Pl 7th Ed 132 *Atkins in Him Dist* 391 632 and 735 *H on Prod*
N W P 1 90 Lisboa *U Pl Bomb* 137 188 209 238 277 *Notard*
Paper mucking Mt 72 73 *The Flder Grasses of Northern Ind* by J
F Duthie p 71 *Spons Encyclop* 921 *B lfour Cy lop* 914 *For Admin*
Report Chutia Nagpur 1885 34 *Bombay Gazetteer XI* 30 *Indian*
Forester I 233 255 268 336 346 359 *II* 19 111 205 *IV* 229 321
VII 163 *VIII* 106 123 271 301 369 411 415 416 418 *IX* 529 to
539 *X* 134 159 548 *XII* 203 312 413 418, *XIII* 55 115 121
513 522 523 *XIV* 419 *Manual of the Madras Presidency II* 27

Habitat — Met with throughout India but most abundantly in the plains and lower hills of Northern and Central India ascending to 3000 feet Kurz says it is a xeroclimatic species common on the Continent of India but does not go further south than Upper Tenasscrium He describes it as a bushy plant from 20 to 30 feet in height Dr King remarks that it is the only bamboo found on Mount Abu It is scarce in Banda but in the drier districts of Central and Southern India it affects the cooler northerly and westerly slopes In Bengal and along the foot of the Himalaya where the climate is damp it occurs chiefly on the warm southerly faces of the hills It has often deciduous leaves and the stems which frequently attain a height of 100 feet are strong elastic and nearly solid

CULTIVATION

FLOWERING &c — This species is sometimes said to flower gregariously but more frequently single clumps are found to do so Mr Gamble publishes an account of its flowering along the base of the hills in the North West Provinces Mr Greig (the Conservator) reported I have observed numbers with one or two stems of a clump in flower in some places as many as 5 per cent of the clumps have flowering stems and in others I have only found ten clumps with flowering stems out of several thousands examined Between Koldwara and Haldu Khata whole clumps over large areas have seeded and died and the ground is now a dense thicket of young clumps of from 10 to 30 feet high The seeding commenced here in 1869 or 1870 and has been going on ever since Whole areas he continues in Palim Kansore &c seeded and died in 1877 78 (*Man Timbers* 430) Mr Brown writes of the flowering of this species in the North Western Provinces — As an example of great vitality in certain bamboos I may mention here that on the same road along which *Bambusa arundinacea* was growing a clump of *Dendrocalamus strictus* flowered in 1881 and sent forth new but thin shoots in 1882 These flowered again in 188, and now new scraggy and thin shoots are pushing up in the midst of the old clump

With respect to *Dendrocalamus strictus* although the flowering is not so general as with other species yet large areas become fertile at one time The curious point about the flowering of this bamboo in the Siwalik Forests of the Dun and Saharanpur is that the fertility seems to spread onwards gradually and year by year For instance in 1883 most of the clumps in the Charkhari block flowered In 1884 the Maiapur block Saharanpur division became fertile Then the Rampur block was attacked in 1885 and this year 1886 the bamboo in Rauli block seeded

Thus the seeding began in the south-east corner of the Dun turned the corner of the Siwaliks at Hardwar and fertility is now apparently

CULTIVA
TION
Flowering
293

**DENDROCALAMUS
strictus****The Male Bamboo****FLOWERING**

gradually spreading westward among the southern face of the Siwaliks. It remains to be seen whether this gradual march will continue along the rich bamboo forests of the eastern and central ranges of the Saharanpur division. Elsewhere I have seen this species flowering only sporadically. *The Seeding of Bamboos by A F Brown Esq published in the Ind For Vol XII p 413*)

A long and interesting Note on the cultivation of this species in the Central Provinces will be found in the *Indian Forester*. But the following brief passages may be here republished — In every forest producing this species a certain number of stems flower and seed annually but a general seeding is only an occasional occurrence. Regarding the time or conditions of seeding nothing definite is at present known but it is evident that general seedings are associated with a short rainfall. In general seedings all clumps of the same age appear to seed within the two years over which the seeding generally seems to extend. It is the opinion of natives and one which is believed in by many forest officers and others that seeding is prevented or retarded by heavy working of the clumps the opinion is doubtless to a certain extent correct but it is improbable that cutting will have effect if deferred till the clumps begin to flower. It is not an uncommon thing to find small one year old shoots from clumps entirely cut over producing seed. It has been observed that a poor and unfavourable soil is conducive to the production of seed.

Probably the real cause of seeding is exhaustion of the soil accessible to the roots of the clumps which is felt the more the dryer the season a supposition further supported by the fact that seeding is more common on poor than on rich soils. Stems that flower casually yield hardly any fertile seed and hardly any seed at all whereas in the general seedings the yield is very large and of excellent quality especially in the first year (*Ind Forester IX 531*).

Speaking of the shedding of the leaves Mr Kurz remarks that it becomes often evergreen in damper climates or when grown in moister localities. With reference to the flowering he remarks that this occurs when the plant is between 25 30 years old. A man who has seen two flowerings is considered old. It is generally followed by the death of the clump but exceptional cases are known to me where a shoot was thrown up and grew and formed a new stock. He states that the seedlings grow from 1 to 1½ feet in height during the first year and not more than 4 feet up to the third. Brandis says the stems attain their height in a few weeks at the commencement of the rains in the Panjáb they do not harden fully during the first year. Stewart also remarks that according to the natives it accomplishes its growth in two or three weeks. Owing to the annual shedding of the leaves there is always a large amount of dry foliage on the ground which makes forests of this bamboo liable to large and very destructive fires. The writer in the *Indian Forester* quoted above regarding the cultivation of this species in the Central Provinces remarks — It is probable that as a living plant this bamboo will come into use for the consolidation and support of embankments the complete and endless network of rootlets which develop around every clump and extend from the surface to 9 or even 12 inches below binds the whole surface soil into a solid mass which can be cut into blocks with a spade but is not easily broken until the rootlets die or decay (*Indian Forester IX 529*).

**SOILS
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SOILS SUITABLE FOR D strictus — Widely as the species is distributed it is not to be found in all localities nor on all soils. The slopes of hills ravines and the banks of *nalas* are the favourite localities. In the plains it occurs forming dense masses and covering large areas, but on sandy

The Male Bamboo

(G Watt)

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strictus.****CULTIVA-
TION**

soils only. A rich and free soil, good drainage and plenty of moisture are favourable if not essential to its production. Though as already stated, it is found forming dense masses in the sandy plains, in such places it only flourishes on the banks of *nalas* or where there is a good deposit of vegetable mould. On a considerable area of poor sandy soil it abounds without attaining any size and in such cases its existence can only be attributed to conditions being favourable to germination and to the protection afforded to the young plants by tree vegetation.

In clay soils and the combinations of clay and lime (*kankar*) not unfrequently met with the species refuses to grow. In the black cotton soils of the plains and even in very wet soils it will grow luxuriantly when once thoroughly established but young plants soon succumb to excessive moisture.

Though not very productive, pure bamboo forests exist in several places in the Central Provinces; the species thrives best when associated with tree vegetation. It is more or less shade bearing according to age as a young seedling except under artificial cultivation it will not without shade live through a single hot season while even with mature clumps light tree shade appears favourable to the plant and under the latter condition the yield of individual clumps is greater and finer than in pure bamboo forest.

REPRODUCTION—This is secured by seed and by rhizomes with rootlets and portions of the stems attached. In the early stage of existence the rhizomes are larger in proportion to the stems and have greater vital powers. It is also probable that the little shoots resembling seedlings in appearance which are occasionally produced in dense masses at each node would take readily if planted and that shoots hid under ground with portions of the leaf bearing branches above would take root and produce shoots at each node.

The artificial cultivation of this species has in the Central Provinces only been carried on since 1875 and as might be expected there is much yet to learn on this subject nevertheless a certain amount of information and experience has been gained which it would be useful to place on record.

In propagating by sets from existing clumps it is advisable that three or four shoots with their rhizomes should be taken together with their roots for each pit to be planted and that as much of the soil as possible should be preserved above the roots. The stem should be cut back immediately above joints to a length of five or six feet; the sets should be planted as quickly as possible six to eight inches of stem being placed below ground. The first burst of the monsoon is the most favourable time for this operation; in the absence of rain the water supply must be kept up artificially till foliage is developed; if the soil is good further tending will be unnecessary; clumps thus raised on good free soil produce marketable shoots in five years.

In propagating by seed sowings may be made *in situ* or seedlings may be raised in nurseries and transplanted. Of the former method experience is confined to the result of one experiment in which the area dealt with was 50 acres situated on the slopes of hills. The soil was not good though not extremely poor but there was a little cover on the ground; the sowings were in prepared lines but no manure of any kind was applied. The seed was put down in July but sown too thickly and at the end of the rains the plants averaged 18 inches or four times the height of natural seedlings of the same age but the plants were weak. Had the soil been rich and the sowing less thick or had the plants been properly thinned on appearance above ground it is more than probable

Reproduction
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Propagation
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Shoots
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Seeds
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that the growth would have been really vigorous. It is probable that excellent results may be obtained by sowing in pits three feet in diameter and one foot deep filled with good rich mould provided the plants are thinned till when four feet in height not more than four plants should stand in each pit. If the seed be good more than 10 seeds to the acre is not likely to be necessary. As bamboos need not as a rule be planted nearer than 15×15 feet an acre of nursery will suffice for planting about 80 acres.

**Thinning or
Cutting
299**

THINNING OF CLUMPS AND CUTTING FOR THE MARKET — As regards cutting or thinning it is obviously essential to preserve in a vigorous condition those eyes whose turn it is next to produce shoots. It has already been indicated that after clumps have produced full sized shoots reproduction is generally from rhizomes of two years old though occasionally it proceeds from those of greater age. It is therefore obvious that to secure a maximum production no shoot should be cut until the end of the second monsoon succeeding that in which it was itself produced unless increased production is rendering the forest too dense a condition which cannot be said to exist as long as there is ample space for the full development of foliage on all standing stems and clear space for the upward course of new shoots.

The maintained production of shoots must prevent general seedings which only succeed the cessation of the production of shoots. It is also probable that the complete removal of the older shoots will result in the decay of the rhizomes attached to them and that thus the stems left will become independent of the old parent root and be less likely to seed than if their connection were maintained. As long therefore as the production of shoots does not annually increase and there is no indication of the standing crop being too dense all shoots should be preserved till the dry season following the second rains after that in which they were produced when they should be cut and removed. The author of the interesting article on this bamboo from whom the above passages have been abstracted proceeds to state that where a demand exists for green stems a limited amount may be cut from each clump but that unless the reproduction be vigorous they should not be cut off close to the ground but two feet above thus leaving eyes for the development of branches and foliage to preserve the vigour of the root.

**Season of
Cutting
300**

SEASON OF CUTTING AND PERIOD WHEN THE CLUMPS COME INTO BEARING — With the view to production the best season for cutting is from the time the leaf begins to fade up to the time the clumps become leafless. The period before a wild or cultivated forest may be expected to come into bearing has been variously stated. The number of years necessary for the production of full sized shoots is undetermined but is known to vary greatly according to the conditions under which the plants have grown up. In natural forests there is reason to believe that full sized shoots are not produced until the clumps are about twelve years old but in really successful artificial plantations the time will probably be reduced to six years. Sir D Brandis in the passage already quoted states that the shoots attain their full height in a few weeks but in the Panjáb they do not harden during the first year. This of course refers to the formation of shoots on a clump in full bearing condition. Dr Schlich in his Forest Administration Report of the Central Provinces says eight years may be taken as the time in which artificially raised bamboos of this species will under ordinary circumstances come into bearing.

**FIBRE
301**

Fibre — The fibre from the stem is suitable for the manufacture of paper but its high value prevents it from being so used. Kurz remarks that the natives of Behar employ the *jungli bans* (*Dendrocalamus strictus*) for

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strictus

making neatly worked plates hand fans &c which are generally sold in the towns through the whole of India

Medicine — The silicious matter found near the joints in this and most bamboos (*tabashir*) is used as a cooling tonic and astringent medicine. It has not been satisfactorily proved however that *D. strictus* does actually produce *tabashir* but Mr Atkinson affirms that it does. The leaves are given to animals during parturition from a supposition that they cause a more rapid expulsion of the placenta (*Dr Emerson*). For this purpose it is said to be used by native women both criminally and in ordinary midwifery practice.

SPECIAL OPINIONS — § A decoction of the leaves is given to women after delivery to put the uterus in order (*Assistant Surgeon T. N. Ghose Meerut*). The juice of the leaves in about two-ounce doses taken frequently is used in certain parts of the North Western Provinces for causing criminal abortion (*Assistant Surgeon Nobin Chunder Dutt Durbhanga*).

I have seen the leaves used to aid parturition (*Civil Surgeon S. M. Shircore Moorshidabad*). The joints when made into a decoction are used as a medicine to procure abortion (*Surgeon Major A. S. G. Jayakar I. M. D. Muskat Arabia*). The leaves are given to horses when suffering from cough and the leaves boiled in water for convalescents to bathe in (*Honorary Surgeon P. Kinsley Chicacole Ganjam Madras*).

Food and Fodder — The LEAVES are eaten by buffaloes and are fairly good fodder for horses. Duthie remarks the foliage affords abundant fodder for elephants and Lisboa that the leaves are eaten by cattle. The SEEDS are eaten by men in times of famine. The relative value of this food may be estimated by the fact that while wheat the principal food grain sold at 12 seers for the rupee bamboo seed sold at from 40 to 50 seers (*Indian Forester IX 59*).

Structure of the Wood — This is the male bamboo of most writers a name given to it because when fully developed it becomes practically solid. It would appear however that in certain localities and soils it does not show so pronounced a tendency to do so as in others the central canal often remaining fairly large. The outer shell is however hard and strong yet elastic and hence this is for its size one of the most useful of bamboos. It is employed for a variety of purposes such as spear handles and all the requirements of native house-building and for basket work. The following passage from the *Indian Forester* enumerates some of the uses —

In the Central Provinces this bamboo is used as a substitute for timber for rafters and battens spear and lance shafts walking sticks whip handles ploughman's driving sticks and spade handles stakes to support sugar-cane on light soils stakes for *pan* plants and for construction of *jaffries* for *pan* gardens for the construction of strong fences to resist wild animals the manufacture of small mats used like slates in roofing mats for floors covers of carts and various other purposes sieves hand punkahs umbrellas light chairs and sofas drenching horns vessels for holding grease and oil specially for lubricating cart wheels bows arrows and cordage and for the manufacture of many other minor articles. It is also used for the buoyage of heavy timbers in rafting and when converted into charcoal is in request for the finer smith's work. Dry stems are also used for torches and the production of fire by friction (*Indian Forester IX 529*).

Trade in Male Bamboos — Very little can be learned of the trade in this most valuable article. The reports that exist deal with limited tracts and for different seasons so that a combined statement for all India can not be drawn up. The value of the bamboo varies according as the culms are green (e.g. young) or dry and seasoned. In the vicinity of large towns

MEDICINE
Tabashir
302
Leaves
303

FOOD AND FODDER
Leaves
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Seeds.
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TIMBER
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Spear Handles.
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Rafters
308
Battens
309
Walking Sticks
310
Stakes
311
Torches &c
312

TRADE
313

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strictus****The Male Bamboo****TRADE**

and markets the higher value generally attaches to green bamboos being sometimes as much as twice that of dry bamboos. As regards seasoning the preference is in some places given to bamboos that have been soaked in water for a length of time while in others bamboos thus seasoned will not command a market. The chief use of water seasoning appears to be the destruction of the insects which attack the bamboo when cut out of season. Bamboos cut in the rains are always liable to speedy decay.

**Hyderabad
314**

Particulars were called for (in connection with the preparation of the present article) as to the trade in this bamboo its price and other such information. The reports received from the various provinces of India may be here summarised. Of Hyderabad (Berar) *D strictus* is stated to occur chiefly in the hills of the Gawilgarh Range. It is said also to be common in Melghat—plentiful in the reserves though disappearing from the forests. The total exports during the past ten years are reported to have been valued at Rs 54 885 or a mean annual value of about Rs 5000. The local price is returned as Rs 8 per hundred.

**Coorg
315**

Of Coorg it has been reported—Chiefly used in roofing fencing baskets &c annual sales from Government forests in Coorg 2 lakhs, price in the forest Rs 1 to Rs 8 per hundred. Probably 8 or 10 lakhs could be cut yearly from the Coorg forests without diminishing the supply. From a forest point of view it is desirable to diminish the number to a large extent and allow timber to take the place of the bamboo. If it were not for the periodic seeding and dying off of the bamboos they would gradually cover the whole forest to the exclusion of tree growth as tree plants seldom get up where bamboos are thick. The seeding of the *D strictus* usually takes place by clumps. Every year scattered clumps seed.

**Madras.
316**

Two reports from Madras may be here given. Of the Northern Circle it has been said—This is the male bamboo. Universally found on the drier slopes of hills and occasionally in ravines where as in the Nilghiris it often attains a large size even 3 4 inches in diameter. It is in general use for all the purposes for which bamboo is required. The annual production cannot well be given as the supply is so much greater than the demand but the amount exported from the Government Forests is very considerable (See Annual Report). Of the Southern Circle *D strictus* is reported to be common in dry forests up to 3000 feet. It is universally used for building purposes and is in demand for spear shafts and the like. It is impossible at present to say what the annual production and amount available may be. The Government seigniorage is Rs 4 per cart load of half a ton the collection and transport of which costs the purchasers from Rs 4 to Rs 5 and fetches from Rs 6 to Rs 9.

**Ajmere
317
Bombay
318**

The Conservator of Ajmere-Merwara writes that *D strictus* is scarce in his district selling for Rs 10 per hundred. Mr McGregor (Conservator of Forests Southern Division Bombay) reports that this bamboo occurs chiefly in the drier forests but is very local. The rate charged is one rupee per 100 stems. Mr A T Shuttleworth (Conservator Northern Division) remarks that it is very abundant in the forests but is disappearing in parts owing to its being overworked. It is used largely in connection with betel vine cultivation in the Thana District as props or supports. From the North West Provinces several communications have been received. Of the Dehra Dun Division it is said to be the chief wild bamboo. It is found in large quantities only at the eastern end of the district near and on the Siwaliks. With regard to the market this bamboo is classified into six kinds. These are as follows—

**N W
Provinces
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(1) *Sarancha*—A hollow bamboo 6' to 9' girth 12' long. Used for chicks baskets shouldari poles &c. Annual export from

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Dehra Dun Division into or through Hardwár about 700 scores at 5 annas per score

- (2) *Rakmí* or *Chanju* — Hollow or solid bamboos up to 6 girth and 10' long. Mainly used for thatching. Annual export as above 28 000 scores at 2½ annas per score
- (3) *Lathí* — The hollow or solid lower thick end of the bamboo used for sticks. Annual export as above about 35 000 scores at 2 annas per score. Chiefly sold to pilgrims in Hardwár
- (4) *Kain* — The branches of the bamboo used for fences and in thatching small houses. About 100 headloads are exported annually
- (5) *Poochli* — The upper portion of the bamboo above the *Saráncha* used for thatching purposes about 9 long. Annual export about 5 000 scores at 1 anna per score
- (6) *Dry bamboos* — Ten feet long are used for thatching. About 11 000 scores annually exported at 1½ annas a score

Of the Saharanpur Division it has been reported that in Hindustani *Dendrocalamus strictus* is called *Mooger* its girth is from 8 to 9 and height 70 to 80. It germinates in March and August being the Hindi months *Chait* and *Sauan* respectively. In the first year it grows thirteen times its original girth in the second and third years three times its girth. After three years it ceases to grow any higher. It grows (but very scarce) in some places in Garhwál and Rampur and is cut during January and November in the year. It is used for four purposes: the topmost portion for fishing rods, the second portion for lance staves, the third for making *charhao* or *phar* of carts and the fourth for making baskets &c. It is sold at ₹40 per score and is available in Garhwál and Rampur.

Of Bengal (Chhutia Nagpur Division) the Deputy Conservator of Forests reports: Found in the Singhbhum District. Wood used for building, fencing, baskets, mats, walking sticks, spear shafts, axe handles &c. also building houses. It is plentiful and is sold at 4 to 8 annas per 100 in the forests.

The male bamboo is also found in the Hazaribagh forests and in the Angul forests of Orissa. Specimens have been sent from both forests to the military authorities at Calcutta from the former for lance staves and from the latter for army signalling. Canes were however pronounced more serviceable for signalling as being lighter. The annual production at Kodarma is two to four in each clump. Price 12 annas per hundred. 10 000 male bamboos are available in the Kodarma range.

Mr A Smythies (*Indian Forester* VII 163) furnishes some interesting facts regarding the Central Provinces. He asks the question—why is *Dendrocalamus strictus* *Nees* called the male bamboo? He presumes this is because of its reputation of having a solid stem, but he adds: I have never myself seen a stem *entirely* solid though I have no doubt there are such. I have seen many with a very small cavity and many more with a large cavity. The Members of the Nagpur Hunt Club in my time were wont to use as spear shafts *almost solid* stems of *D. strictus* as solid as they could get them and I remember in 1877 supplying the local but celebrated spear maker Boput of Nagpur with about one hundred shafts of the almost solid stems of this bamboo. They came from the Moharli Forests of the Chanda Division but *there* they were only found in one particular tract on Vindhyan sandstone which had been preserved from fire for some years previously. Boput told me at the time that the only other place where he could procure sufficiently solid stems was a certain forest in the Chindwara District the name of

TRADE.

Fishing Rods
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Lance Staves
321
Bengal
322

Central
Provinces
323

Spear Shafts.
324

DERRIS elliptica**TRADE**Solid
Bamboos
325**The Male Bamboo**

which I forget This tends to show that the solid or almost solid stem of this bamboo is not common at least near Nagpur

It is this kind of stem used for spear shafts which I have always understood to be the male bamboo How is it therefore that the name of male bamboo is applied to the entire species?

The Editor of the *Forester* in a foot note to the above passages suggests that Boput might try the solid bamboos procurable in Chhutia Nagpur (Palamow or Koderma)

The writer had numerous applications while on duty at London (in connection with the Colonial and Indian Exhibition) as to the best course to be pursued in the effort to establish an agency to supply English manufactures with solid bamboos One dealer was desirous of procuring a regular supply suitable for lance shafts another maker wished to obtain bamboo suitable for splitting up and afterwards consolidating the strips in the construction of fishing rods The writer was unable to furnish the desired information but is in hopes that the present general compilation from all available sources of information may suggest the most likely localities from which supplies might be drawn From the above quotations mainly from the *Indian Forester* it would seem pretty certain that *D strictus* in any or every locality will not do It is necessary to select a particular area where the bamboo is known to produce stems of the required degree of solidity This fact suggests an enquiry that would seem worthy of the attention of persons who may have the opportunity of following it out as to the peculiar climate soil and exposure that is found to produce the more solid condition of stem Possibly it may be found that although belonging to the species *D strictus* there is a recognisable variety that possesses the desired property From some such enquiry results of great value might be expected such as the propagation under the required climatic condition or on the necessary soil or if climate and soil be found of minor consideration a wider distribution of the superior stock might be encouraged so as to establish plantations of solid bamboos in accessible regions

Dendrocalamus Tulda, *Nis* see **Bambusa Tulda**, *Roxb*

Deodar See **Cedrus Deodara** Loudon (now recognised by Sir J D Hooker as **C Libani** *Barrel* var **Deodara Hook**) CONIFERÆ—see Vol II No 846 p 235 of this work

DERRIS, *Lour* Gen Pl I 549

A genus of arborecent climbers or trees embracing some 40 species abundant in India but according to the *Flora of British India* found belting the world in the tropics Thwaites remarks that in Ceylon the barks of the species there met with are used by the Singalese for making ropes Very little of an economic nature has been recorded regarding the Indian species and only one or two need therefore be here mentioned

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Derris elliptica, *Bth* Fl Br Ind II 243 LEGUMINOSÆ

Syn —PONGAMIA ELLIPTICA Wall *Wight Ic* t 420

Vern —*Tubak* MALAY PENINSULA

References —*Roxb* Fl Ind Fd C B C 539 *Kurz For Fl Burm* I 340 *Christy Com Pl and Drugs* No 10 1887 39 *Kew Reports* 1887 p 43

Habitat —A large handsome climber met with in Martaban Burma, Penang Malacca and Siam &c

Poison —According to the Kew Report of 1877 the roots of this plant steeped in water afford a useful insecticide for gardening purposes

POISON
Roots
327**D** 327

The Desmodium Fibres

(G Watt)

DESMODIUM
Cephalotes.

It is also used to kill fish No Indian author appears to allude to this fact The Malays use the bark as one of the ingredients in their Ipoh arrow poison

Derris robusta, Bth Fl Br Ind, II, 241

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Syn—DALBERGIA KROWEI Roxb Ed C B C 535 BRACHYPTERUM ROBUSTUM Dals & Gibs Bomb Fl 77 DALBERGIA ROBUSTA Roxb, Hort Beng 53

Vern—Mowhatta ASSAM Bolkakark GARO; Krowee SYLHET; Gum bong MAGH Buro KUMAON

References—Brandis For Fl 154 Kurz For Fl Burm I 339; Gamble Man Timb 133 Atkinson Him Dist 344 Indian Forester XIV 298 Balfour Cyclop I 879

Habitat.—A deciduous tree (30 to 40 feet in height) of the outer Himalaya, from the Ganges eastward to Assam, Eastern Bengal and down to Pegu

Structure of the Wood—Light brown hard It may be used for tea boxes Roxburgh says it grows quickly to a large size yielding timber of a dark brown colour and rather too porous for furniture but seems very fit for various other purposes Kurz writes the wood is red brown hard and close-grained of a short coarse fibre but soon attacked by xylophages

TIMBER
329**D scandens, Benth Fl Br Ind II 240 Wight Ic t 275**

330

Syn—D TIMORIENSIS DC PONGAMIA CORIACEA Grah BRACHYPTERUM SCANDENS Dals & Gibs Bomb Fl 76

Vern—Noalata BENG Gola : potra nalavari GOND Gunj Pb Cheratala badu (or chiratala badi) nala tige motta siris TEL ; Tupaul MALAY Migyaungnwe (meekyoung nway) BURM

References—Brandis For Fl 154 Kurz For Fl Burm I 339; Gamble Man Timb 133 Dals & Gibs Bomb Fl 76 Elliot Fl Andh 41 117 171 Bombay Gas (Kanara) XV I 433

Habitat—A handsome climbing shrub met with in the Eastern Himalayas and the Western Ghats passing round the coast to Chittagong and Siam

Fibre—The bark affords a coarse rope fibre

FIBRE
331**Desmanthus cinereus, Willd (alluded to by Ainslie in Mat Med II 458) is now known as Dichrostachys cinerea, W & A which see****D nutans, Willd (Roxb Fl Ind Ed C B C 420) see Neptunia oleracea our****DESMODIUM, Desv ; Gen Pl Vol I 519 1002**

A genus of shrubs or herbs embracing 120 species which are cosmopolitan in the tropics 49 met with in India. The generic name is derived from *Desmos*, a bond in allusion to the union of the stamens Very little of an economic nature is known regarding these plants The bushy species seem all to contain fairly good fibres which in some cases are used for paper making The following is a brief enumeration of the more common Indian members of the genus

Desmodium Cephalotes, Wall ; Wight Ic II 209 and 373, Fl Br Ind Vol II, 161 LEGUMINOSÆ

332

Syn—HEDYSARUM CEPHALOTES and UMBELLATUM Roxb (Fl Ind, III 360) DESMODIUM CONGESTUM Wall

Vern—Bir jhamar SANTAL Bodle kura NEPAL ; Maniphtyol LEPCHA Chetenta TEL

References—Voigt Hort Sub Cal 221 Kurz For Fl Burm I 386; Beddome Fl Sylva 87; Gamble Man Timb 121 Dals & Gibs Bomb Fl 66 Campbell List of the Economic Products of Chutia Nagpur No 9848 Bombay Gas (Kanara) XV, Pt I 433

D 332

BESMODIUM
latifolium**The Desmodium Fibres****FOOD and**
FODDER**333**
TIMBER**334****335****MEDICINE****336****FODDER****337****338****339****MEDICINE****340****341****Habitat** — A shrub of the Eastern Himalaya Central Bengal Western Ghâts South India and Burma, ascending to 3 000 feet**Food** — According to the Rev Mr Campbell the Santals eat the fruit of this plant He also says cattle and goats eat the leaves**Structure of the Wood** — Yellowish in structure resembling *D. tilae folium***Desmodium diffusum, DC Fl Br Ind II 169****Habitat** — A herbaceous plant one to two feet in height found in the plains of the Western Peninsula Bengal Orissa Bundelkhand and Burma**Medicine** Sir Walter Elliot (*Fl Andh* 16 36) enters into a discussion as to the plant meant by the Telegu name *Cheppu tatta* the *Antinulu* of some writers In his experience these names denote *Desmodium diffusum* but Beddome found the former given to *Coldenia procumbens* and Ainslie assigns it (*Mat Med I* 23) to *Asarum europæum* It seems desirable to prevent confusion between these two plants especially as the latter is a drug of some importance (*Conf* with *Asarum Vol I No 1545, page 337*)**Fodder** — Roxburgh says the foliage of this species is eaten by cattle**D floribundum, G Don Fl Br Ind II 167****References** — *Kurs For Fl Burm* 387 *Atkinson Him Dist* 342 456**Habitat** — A shrub met with throughout the Himalaya up to 5 000 feet also in the Khasia Hills In Sikkim it is common in old cultivated lands at 3 000 to 5 000 feet

[II 168]

D gangeticum, DC Wight Ic II 271 & 272 now 270 Fl Br Ind**Syn** — *HEDYSARUM GANGETICUM Willd Roxb Fl Ind Ed CBC* 575**Vern** — *Sarwan salpan salun HIND Salpani BENG Tandî bhedi janetel SANTAL Pustbani N W P Shal purni* (Bazar name for the leaves) *PR Salpani salwan dâye BOMB Gita naram koluku ponna TEL Sila parni SANS***References** — *Voigt Hort Sub Cal* 221 *Stewart Pb Pl* 67 *Sir W Elliot Fl Andh* 60 92 *Campbell List of Econ Pl Chutia Nagpur No* 9275 *U C Dutt Mat Med Hind* 145 316 *Dymock Mat Med W Ind 2nd Ed* 222 *Irvine Mat Med Patna* 100 *Atkinson Him Dist* 342 456 *Botanical Tour to Hasara by Stewart (Journ Agri Hort Soc Ind XIV* 43) *Indian Forester VIII* 101 407-8 417 *XII App II Gazetteer of Bundelkhand 80 Gazetteer Kanara* 432**Habitat** — A common species on the lower hills and plains throughout India On the Himalayas it ascends to 5 000 feet and is distributed east to Pegu and Ceylon**Medicine** — This shrub is regarded as a febrifuge and anti catarrhal it is one of the chief ingredients of the Hindu preparation *dasamula koatha* so frequently alluded to in Sanskrit works The reader is referred to *U C Dutt's Mat Med of the Hindus p 145* for a full account of the preparation or to *Dymock's Mat Med West India* where that article is reproduced**SPECIAL OPINION** — § Is one of the ten roots (*Dasha mula*) of the Hindu Materia Medica (*Assistant Surgeon Sakhamam Arjun Ravat L M Gorgaum Bombay*)**Desmodium latifolium, DC Fl Br Ind, II, 168 Wall, Cat, 5692, Wight Ic I 270****Vern** — *Sim matha sura SANTAL Gaba TEL Kibun BURM***D 341**

The Desmodium Fibres	(G Watt)	DESMODIUM tiliaefolium
<p>References — <i>Vogt Hort Sub Cal 221 Kurr For Fl Burm 385 Sir W Elliot Fl Andhr 55 Atkinson Him Dist 342 456</i></p> <p>Habitat — An erect undershrub (3-6 feet high) found on the Eastern Himálaya to Burma Siam and Ceylon</p> <p>Fibre — It affords a strong paper fibre</p>		<p>FIBRE 342 343</p>
<p>Desmodium parvilolium, DC, Fl Br Ind II 174</p>		
<p>Vern — <i>Tandi chatom arah tandi sunsunu SANTAL Khet sunsunu HIND</i> (in Chutia Nagpur)</p> <p>Habitat — A small densely caespitose and much branched plant common everywhere on the plains of India and from the Himálaya to Ceylon ascending to 7 000 feet in altitude</p> <p>Food and Fodder — The Santals appear to eat this plant as a green vegetable Mr Duthie remarks that it is eaten by cattle camels and goats in Jeypur State</p>		<p>FOOD AND FODDER 344</p>
<p>D polycarpum, DC Wight Ic t 406 (non Wall); Fl Br Ind [II 171</p>		<p>345</p>
<p>Syn — <i>D ANGULATUM Wall, D OVALIFOLIUM Wall D SILIQUOSUM DC D HETEROCARPUM DC; D RETUSUM Don; D GYROIDES Hassk D PATENS Wight HEDYSARUM PURPUREUM Roxb H RETUSUM Don H PATENS Roxb</i></p>		
<p>Vern — <i>Baphol SANTAL</i></p>		
<p>References — <i>Dals & Gibs Bomb Fl 66, Roxb Fl Ind, Ed C B C 578 579 Rev A Campbell Econ Prod Chutia Nagpur No 7833</i></p>		
<p>Habitat — An erect or sub erect undershrub found throughout the Himálaya and everywhere in Burma distributed to Malacca Ceylon Zanzibar Philippines China Japan and Polynesia</p>		
<p>Medicine — The Santals are said to use a preparation of the plant in fainting and convulsions</p>		<p>MEDICINE 346 347</p>
<p>D pulchellum, Benth; Fl Br Ind II 162</p>		
<p>Syn — <i>HEDYSARUM PULCHELLUM Roxb DICERMA PULCHELLUM DC Wight Ic t 418</i></p>		
<p>Vern — <i>Birkaps SANTAL Karra antinta TEL</i> (so called from the pods catching like burs) <i>Toung ta-min BURM</i></p>		
<p>Habitat. — A shrub (3-6 feet high) met with in the Eastern Himálaya and throughout India to Burma Ceylon &c</p>		
<p>D tiliæfolium, G Don Fl Br Ind, Vol II 168; Wall, Cat 5707</p>		<p>348</p>
<p>Syn — <i>DESMODIUM NUTANS Wall D ARGENTEUM Wall HEDYSARUM TILIAEFOLIUM Don</i></p>		
<p>Vern — <i>Sambar shamru chamrá chamyar chamkát chamkál martan motha gurshagal pri marára muss murt laber</i> (according to Gamble) <i>HIND chamyár chamrá marara, gur kats dud shambar pirki kathi laber kál mort PB Bre kuthi KANGRA</i> (most of the above Hind names are given by Stewart as Panjábí names) <i>Laber SIMLA Kalanchi MURRI</i></p>		
<p>References — <i>Gamble Man Timb 120 Stewart Pb Pl 67 Baden Powell Pb Pr 516 577, Atkinson Him Dist 342 456 and 793 Bal four Cyclop 92 Ind For Jany 1885 Vol XI 3</i></p>		
<p>Habitat. — A large deciduous shrub of the Himálaya from the Indus to Nepál found between 3 000 and 9 000 feet It is also said to be met with in Tavoy</p>		
<p>Fibre — The BARK yields an excellent FIBRE extensively employed for rope-making and in many parts of the Himálaya is used also in paper manufacture Mr Atkinson remarks that a trade is done in exporting this paper material to Tibet from Kumáon Stewart in his account of Hazara</p>		<p>FIBRE, Bark, 349 Paper 350</p>

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Detergents and Soap Substitutes.

FIBRE

reports having found it being utilised for paper and textiles In the *Kanara Gazetteer* (p 30) it is stated that the bark is used for paper making in the jail at Dharmasala ' The twigs are employed for tying loads Stewart remarks of the form known as *argenteum* that the ropes made in Kanáwar were not lasting but when fresh are very strong and when platted as thick as the wrist were found to stand under a heavy temporary strain when English ropes snapped

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Roots

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FODDER

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Medicine—The ROOTS are considered carminative tonic and diuretic they are used in bilious complaints (*Dr Emerson*)

Fodder—The leaves afford a useful fodder (*Simla Settlement Report*,

Structure of the Wood—Yellowish brown with a darker centre

[5734 *Wight Ic* 1 292

Desmodium triflorum, DC Fl Br Ind II 173; Wall Cat

Syn—*D HETEROPHYLLUM* Wall *HEDYSARUM TRIFLORUM* Linn H
STIPULACEUM Burm

Vern—*Kodalia* BENG *Kudaliya* N W P *Jangli or ran-methi*
BOMB *Munta mandu* TEL

References—*Roxb Fl Ind Fd C B C* 577, *Voigt Hort Sub Cal*
223 *Thwaites En Ceylon Pl* 86 *Mueller Select Extra trop Pl* 7th
Ed 132 *Sir W Elliot Fl And* 120 *S Arjun Bomb Drugs* 107
Atkinson Him Dist 342 458 and 735 *Royle Ill Him Bot* 194 *Bal*
four Cyclop 922 *Kanara Gazetteer* 432 *Mysore and Coorg Gas* 1 60

Habitat—A small much branched slender trailing plant found every where in the plains throughout India ascending to 4 000 feet in Kumaon and 6 000 to 7 000 feet in Kashmir and on the Chenáb

Medicine—The fresh LEAVES are applied to wounds and abscesses that do not heal well (*Wight*) *Thwaites* remarks that in Ceylon it is valued as a medicine in the cure of dysentery

Fodder—*Roxburgh* says this is very common on pasture ground and helps to form the most beautiful turf we have in India further that cattle are very fond of it *Müller* in his *Select Extra tropical Plants* recommends its cultivation in regions too hot for clover *Ool Drury* informs us that it springs up on all soils and situations supplying there the place of *Trifolium* and *Medicago*

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Leaves

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FODDER

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Detergents and Soap Substitutes

Medically the word Detergent would be given to any substance which had the power of cleansing wounds ulcers &c While the lists of detergents given below embrace the better known substances of that nature they have been made to include also materials employed in place of soap either from cheapness or because of reputed special properties A complete list of the herbs used by the natives of India as detergent poultices or even of those employed to cleanse the hair would indeed be voluminous The present account of detergent materials must therefore be viewed more as suggesting the position of such articles than as an exhaustive account of them

Perhaps the most important of the soap substitutes are the species of *Sapindus* the fruits of which are extensively employed to purify fabrics before being dyed It seems probable that some of these detergents exercise a chemical influence not possessed by soap At all events it is often contended that certain peculiar results in dyeing can be obtained only when the fabric has been first washed with certain detergent vegetable substances and that the same result cannot be brought about if soap be used Speaking of the fruits of *Sapindus Mukorossi* *Gartn* (= *S detergens*, *Roxb*) and of *S trifoliatus*, *Linn* (= *S emarginatus* *Vahl* & *S. laurifolia*,

D 357

Vahl) Brandis says The pulp makes a lather with water and is used extensively for washing either by itself or mixed with soap For flannel and Kashmir shawls it is greatly preferred to soap and some varieties are specially esteemed for washing silk Brandis adds that the subject of these detergent nuts would repay further study It seems highly probable that the natives of India recognise special forms as having definite properties under each of the species formed by modern botanists In the literature of the subject considerable confusion exists Dymock gives *Sapindus trifoliatus* Linn as the true *Ritha* or soap nut Roxburgh assigns that name to the plant now known as *S. Mukorossi* Gertn It is probable that the former is the *Ritha* of Bombay and South India, and the latter of Bengal and Northern India Whether the one is superior to the other or not does not seem to have been investigated and both trees are met with under cultivation throughout the greater part of India Gamble makes practically the same remark under both species viz that the chief value of these trees lies in their saponaceous berries which are largely used and exported as soap substitutes Mr Baden Powell remarks

For finer washing and dyeing purposes the skin or shell surrounding the seeds of the soap nut tree is often used When mixed up with warm water a fine lather is soon produced and the most delicate fabric may be washed and even silks without destroying the colour which would yield to a coarse alkaline soap The nuts are produced in parts of the hills and are called *ritha* or *harita* These nuts contain the principle termed Saponine Several species have in their bark and roots saponaceous properties Dr J F Royle points out that the exact nature of the principle might be advantageously investigated by chemists favourably situated in the native countries of the plants and the nature of the changes ascertained which takes place from the unripe and acrid to the bland and saponaceous ripe fruit (Conf with Dr Dymock's abstract of the chemistry of this substance *Mat Med West Ind 2nd Ed p 190*) Many of the CARYOPHYLLACEÆ have saponaceous properties one genus more especially viz *Saponaria*—*S. officinalis* is the soap wort of European writers Baron F von Mueller says of it that it possesses considerable technological interest as the root can be employed with advantage in some final processes of washing silk and wool to which it imparts a peculiar gloss and dazzling whiteness without injuring in the least any subsequent application of the most sensitive colours In India *Saponaria Vaccaria*, Linn is a common weed of cultivation throughout the plains of India ascending the hills to 7 000 feet in altitude It does not appear generally to have assigned to it the saponaceous properties which its congener enjoys but Murray mentions that in Sind the mucilaginous sap is used by the natives in place of soap for washing clothes The writer recently questioned the cultivators in the Dhami State Simla as to the properties of the *Saponaria* which was found as a troublesome weed in their wheat fields They said that it often proved poisonous to young cattle but that older animals would not eat it They were ignorant of its saponaceous properties By the hill tribes of the Himālaya however two other Caryophyllaceous plants (*Lychnis indica* and *Silene Griffithii*) are known to be useful soap substitutes

Under *Acacia concinna*, DC (Vol I p 45) will be found the main facts known regarding the detergent properties of the pods of that tree These pods are perhaps next to the *Sapindus* berries the best known and most useful detergents A very considerable foreign trade is now done in both these products but in India many others though mostly of considerably less merit are also extensively employed The most general hair purifier in the hands of the natives of India is the unctuous mud found on

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Detergents and Soap Substitutes

HAIR
WASHES &c
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river banks Some of the clays met with locally possess so high a reputation as to constitute regular articles of trade for example the *Mulāni mati* of the bazars of India or the Fuller's-earth of European commerce

I—HAIR WASHES AND DETERGENTS EMPLOYED TO REMOVE VERMIN

The following enumeration exhibits some of the chief articles used by the people of India as hair washes With some of these it may be a matter of question whether they are resorted to as simple detergents as insecticides or as perfumes —

- Acacia concinna*, DC The pods
A. Intsia, Willd The bark used in Sikkim
Ajuga bracteosa, Wall Employed to kill lice
Albizia amara Boivin Leaves used in South India
Allium sativum, Linn Applied along with vinegar to prevent the hair turning grey
Andropogon Schœnanthus Linn Used to promote the growth of hair
Anona squamosa, Linn Powdered seeds along with gram used as a hair wash
Bassia latifolia, Willd Oil cake used as hair wash [wash
B. longifolia Linn Regular trade done in the oil cake as a hair wash
Begonia Rex Putseys The juice also employed to kill leeches
Clay (see remark above also Vol II 361)
Cuscuta reflexa Roxb The seeds
Cyperus scarosus R Br The rhizomes
Daphne oleoides Schreb The bark used in Kanáwar
Entada scandens, Benth The seeds used in Nepal
Haloxylon multiflorum, Bunge The stems and leaves
Indigofera aspalathoides Vahl The ashes used as a wash to remove dandriff
I. tinctoria, Linn A strong infusion of the root said to destroy vermin
Lawsonia alba Linn Hair dye
Malva parviflora, Linn The root
Melia Azadirachta, Linn The seeds
Nardostachys jatamansi, DC Said to promote the growth of hair
Peganum Harmala, Linn The root applied to kill lice
Phyllanthus Emblica Linn Fruits largely employed
Picrasma quassioides Benn The bark an insecticide
Pithecolobium bigeminum, Benth A decoction of the leaves is employed to promote the growth of hair
Prunus Armeniaca Linn The kernels (? or the oil expressed from them) used in the Panjáb as a hair wash
Quercus incana Roxb The galls
Sapindus Mukorossi Gærtn and *S. trifoliatum*, Linn The fruits
Saussurea Lappa Clarke The root largely used as a hair wash
Sesamum indicum Linn A decoction made from the leaves and root is employed as a hair wash and is supposed to blacken the hair

NOTE — Medicinal insecticides will be found in list III

II—SOAP SUBSTITUTES

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SUBSTITUTES
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The list of substances used directly as detergents in cleansing fabrics or as soap substitutes in personal ablution is less extensive than those employed for washing the hair The following may be specially mentioned

- A. arabica*, Willd Decoction of the bark (used in Bengal, Sind &c)

Detergents and Soap Substitutes

(G Watt) DETERGENTS

SOAP
SUBSTITUTES

- Acacia concinna* DC The pods
A. Intsia, Willd The bark
Adansonia digitata Linn The ashes of the fruit and bark mixed with oil The fruit is used in Africa as a soap substitute
Agave americana Linn The juice
Avicennia tomentosa, Roxb Ashes of wood employed in Madras to wash cotton cloths
Balanites Roxburghii, Planch The pulp of the fruit for silk
Carica Papaya, Linn Leaves used by the Negroes to wash linen
Casuarina equisetifolia Forst Ash
Clay Several clays are stated to be used by washermen such as that obtained from Western Sind (see Vol II p 363 see also under *Barilla* Vol I p 356) Dhobies earth
Convallaria multiflora Linn Powdered root used in Lahoul
Dioscorea deltoidea Wall Shawls washed in Kashmir with the tubers
Gardenia campanulata Roxb Used to wash out stains from silk
Haloxylon multiflorum Bunge Used to wash cloths
Hedychium spicatum Ham Rhizomes used in Garhwál 'to wash the newly married
Limonia acidissima Linn Pulp employed in Java as a soap substitute
Lychnis indica Benth Roots and leaves used as soap in Lahoul
Malva parviflora Linn The root is employed in Kanawar to cleanse woollen cloth
Phaseolus Mungo Linn Flour used in place of soap
Sapindus Mukorossi Gertn & *S. trifolatus* Linn The fruits extensively resorted to in place of soap to wash silken and woollen goods (Brandis attributes the property to the pulp Stewart to the large seed and Baden Powell to the skin or shell that surrounds the seed Dymock says that in Bombay soap-nuts sell for Rs 2½ to Rs 3 for 35lb
Saponaria Vaccaria, Linn Juice reported to be used in place of soap
Silene Griffithii Boiss Root and leaves used in Lahoul

NOTE —The above list of Detergents does not of course include the oils employed in soap making and only one or two ashes have been mentioned because these are held to possess special merit Alkalies obtained either from the soil or from plants (Conf Alkaline Earths Vol I, p 167 and with *Barilla*, Say Vol I pp 394—399) is made into native crude soap along with certain vegetable oils See also under SOAP

III — MEDICINAL DETERGENTS

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OR SUBSTANCES EMPLOYED TO CLEANSE FOUL SORES AND TO PROMOTE HEALTHY ACTION

The list here given has been drawn up so as to exclude as far as possible external applications employed for other purposes than the above
Acacia arabica Willd A poultice of the bruised tender leaves is applied to ulcers

- Adiantum venustum*, Don Applied to bruises
Egle Marmelos, Correa Leaves made into poultice and employed in ophthalmia &c
Agave americana Linn Fleshy leaves used as poultice
Albizzia amara, Bowin Poultice to ulcers
A. odoratissima, Benth Bark efficacious in leprosy and inveterate ulcers
Alstonia scholaris R Br Milky juice applied to ulcers
Anamirta Cocculus W & A An ointment employed as an insecticide to destroy pediculi &c and in obstinate skin diseases

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- Argyrea speciosa* Sweet Root used by the Santals in the cure of running sores
- Artemisia vulgaris*, Linn An infusion of the leaves applied as a fomentation in ulcers
- Artocarpus integrifolia*, Linn The young leaves used in skin diseases and the juice applied to abscesses to promote suppuration
- Asagraea officinalis*, Lyndl A decoction used to destroy pediculi
- Avicennia tomentosa*, Jacq Unripe seeds used as a poultice to hasten suppuration
- Balsamodendron Mukul*, Hook Resin used in preparation of an ointment for bad ulcers
- B Myrrha*, Nees A detergent to cold tumours
- B Opobalsamum* Kunth Resin made into a paste with lard is applied in scrofulous and cancerous sores
- B pubescens* Stocks Resin in form of ointment may be applied to cleanse and stimulate ulcers
- Bauhinia variegata* Linn Bark is useful in scrofula ulcers &c
- Boswellia serrata*, Roxb An ointment of the resin is applied to ulcers &c
- Calophyllum inophyllum* Linn Resin used for indolent ulcers
- Capparis horrida* Linn f Cataplasm of leaves useful in boils swellings and piles
- Cassia alata* Linn Leaves used for ringworm and other skin diseases
- C Fistula* Linn Bark and leaves used in skin diseases
- C occidentalis* Linn Same as above
- C Sophora*, Linn Bark leaves and seeds with sandal wood regarded as a specific in ringworm
- C Tora* Linn Bark leaves and seeds used in ringworm
- Cedrus Deodara* Loud The oil from wood used as a remedy for ulcers &c and for sore-feet in cattle
- Cerevisiae Fermentum* (Yeast) Used as poultice
- Ceriops Candoleana* Arnott Decoction of bark applied to malignant ulcers
- Citrus Aurantium*, Linn Poultice of oranges is recommended in skin affections
- Colchicum autumnale* Linn Used in obstinate skin diseases
- Conium maculatum* Linn An extract used in tumours
- Cordia Myxa* Linn Kernels employed in ringworm
- Curcuma longa*, Roxb A paste made of the flowers is used in ringworm and other parasitic diseases
- Cycas Rumphii* Miq Resin applied to malignant ulcers it excites suppuration in a very short time
- Cynometra ramiflora*, Linn Lotion of the leaves in milk applied to skin diseases
- Delphinium coeruleum*, Jacq Roots applied to kill maggots in the wounds of goats
- Desmodium triflorum*, DC Fresh leaves applied to wounds, &c, that do not heal well
- Dioscorea bulbifera*, Linn Powdered tuber applied to ulcers This remark is applicable to most yams
- Diospyros montana*, Roxb The fruit placed by *Bhists* on the boils which generally appear on their hands
- Dipterocarpus turbinatus*, Garin Wood oil applied to ulcers, ring worm
- Embellia Ribes*, Burm Fruits made into various remedies for ring worm and skin diseases
- Eryum Lens*, Linn Poultice applied to ulcers and in small pox &c.
- Eugenia operculata*, Roxb Leaves used by the Santals in dry fomentation to sores

Detergents and Soap Substitutes (G Watt) DETERGENTS.

Ferula Narthex Boiss or F. alliacea, Boiss	The resin employed as a paste in ringworm	MEDICINAL DETERGENTS.
Ficus bengalensis, Linn	Heated leaves applied as a poultice to abscesses	
F. Carica, Linn	Fruit used as a poultice	
F. Cunia Buch	A bath made of the fruit and bark is regarded as a cure for leprosy	
Flemingia congesta Roxb	Santals use the root as an application to ulcers and swellings on the neck	
Garcinia indica, Choisy	Kokum butter is employed in indolent sores	
Gardema gunnifera, Linn f	Gum used to keep off insects from sores on cattle	
Grewia asiatica, Linn	Leaves applied to pustular eruptions	
Gynandropsis pentaphylla DC	Ointment made of the plant with Sesamum oil is used in skin diseases	
Gynocardia odorata R Br	Oil used extensively in skin diseases scrofula	
Helicteres Isora, Linn	Fruits made into a liniment for sores in the ear	
Heliotropium brevifolium Wall	Juice used to promote suppuration	
Hibiscus esculentus Linn	Fresh capsules are employed as a demulcent and emollient poultice	
Hiptage Madabloti Gartin	Leaves esteemed in skin diseases	
Holarrhena antidysenterica Wall	Fruits made into a paste to allay pain in wounds	
Hydrocotyle asiatica Linn	Leaves applied to ulcers and skin diseases	
Hydrolea zeylanica Vahl	The leaves beaten into a pulp are considered efficacious in cleaning and healing bad ulcers	
Indigofera aspalathoides, Vahl	Leaves and flowers are applied in leprosy and cancerous affections	
I. tinctoria Linn	An ointment is made from the extract which is used in sores The dry powder is sprinkled over foul ulcers to cleanse them	
Jasminum humile Sims	The root has been found useful in ringworm	
J. officinale Linn	Same as above	
Jatropha Curcas Linn	The milky juice is said to be detergent	
Kalanchoe spathulata DC	Leaves in Kangra are burned and applied to abscesses	
Lagenaria vulgaris Seringe	The pulp used as a poultice	
Lawsonia alba Lam	A decoction of the leaves applied to ulcers sores	
Lepideropsis orbicularis, Mull	The bark is used by the Santals in skin diseases	
Lepidagathis cristata, Willd	The ashes are used by the Santals in the cure of sores	
Linum usitatissimum Linn	Seeds employed as a poultice	
Luffa acutangula, Roxb var Amara.	Leaves applied to sores in cattle	
Lycopodium clavatum, Linn	Applied to boils carbuncles and papular eruptions &c	
Malva rotundifolia, Linn	Seeds employed in skin diseases	
Mangifera indica, Linn	The gum-resin mixed with lime-juice or oil is applied to cutaneous affections scabies &c	
Melia Azadirachta Linn	Leaves made into poultice are applied to ulcers and skin diseases of long standing An oil is also similarly used	
M. Azadirachta, Linn	Leaves and bark made into poultice which is employed in leprosy and scrofula A poultice of the flowers is said to kill lice and to cure eruptions of the scalp	
Mesua ferrea, Linn	A paste of the flowers with butter and sugar is used in piles	
Milletia auriculata, Baker	Root applied to sores on cattle to kill vermin	

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- Mirabilis Jalapa, Linn** The leaves used as a poultice to promote suppuration
- Momordica Charantia Linn** Whole plant powdered and applied in leprosy and malignant ulcers
- Morinda citrifolia, Roxb** The leaves used to promote healthy action in wounds ulcers &c
- Nelumbium speciosum, Willd** The root is used as a paste in ring worm &c
- Nerium odorum Soland** The root is said to be highly efficacious in skin diseases
- Nigella sativa Linn var indica.** The seeds in combination with sesamum oil are used for skin eruptions
- Nyctanthes Arbor tristis Linn** The powdered seeds are used to cure scurfy affections of the scalp The Santals employ a preparation of the root to cure goose skin
- Ocimum Basilicum Linn** The juice of the leaves useful in ring worm
- O canum Sims** The leaves made into a paste are used by the Santals in the cure of parasitic skin diseases
- Odina Wodier Roxb** A decoction of the bark is useful in old ulcers
- Olea europea Linn** The oil is applied to skin diseases
- Oroxylum indicum Benth** A powder made from the bark is employed in the cure of sore-backs of horses
- Oxytelma esculenta Br** The milky sap is used in Sind for ulcers
- Oryza sativa, Linn** Rice poultice largely used as a substitute for linseed
- Pedalum Murex Linn** Leaves employed as a useful poultice
- Penaea mucronata Linn** The gum applied to sloughing ulcers
- Peucedanum graveolens Benth** Leaves moistened with oil are used as a poultice or suppurative
- Phyllanthus simplex Linn** Root applied to mammary abscesses
- Piers ovalifolia D Don** The young leaves and buds are used to kill insects and an infusion is employed in cutaneous diseases
- Pinus longifolia Roxb** Resin used as a plaster to abscesses in order to cause suppuration
- Pistacia Terebinthus, Linn** The turpentine is considered very valuable in cancer
- Pongamia glabra, Vent** A poultice of the leaves is applied to ulcers infested with worms the juice of the root is used as a wash for foul sores the oil is one of the best native remedies for cutaneous diseases
- Rhinacanthus communis Nees** Root bark used in dhobi's itch
- Saponaria Vaccaria, Linn** Juice used as a detergent and in the cure of itch
- Sesamum indicum Linn** A poultice of the seeds applied to ulcers
- Sesbania egyptiaca Pers** Leaves as a poultice to promote suppuration
- Tamarindus indica, Linn** Poultice of the seeds is applied to boils &c and of the leaves and pulp of the fruit to inflammatory swellings
- Tamarix gallica, Linn** Strong infusion of galls applied to foul ulcers
- Terminalia Arjuna Beddome** Decoction of bark used in ulcers and cancers
- Thespesia populnea Corr** The yellow juice of fruit is used in cutaneous diseases
- Trichosanthes dioica, Roxb** The root is resorted to in treatment of leprosy
- Vallisaria Heynei Spreng** Milky juice applied to wounds and sores
- Vernonia anthelmintica, Willd** Seeds of great repute in Sanskrit Materia Medica for white leprosy and other skin diseases
- Vitex Negundo, Linn** The juice of the leaves has the property of removing foetid discharges from ulcers

Detergents and Soap Substitutes (G Watt) DETERGENTS.

Woodfordia floribunda, Salisb The powdered flowers are sprinkled over ulcers to promote granulation

Zizyphus vulgaris Lam The bark is used to clean wounds and sores

MEDICINAL
DETERGENTS.

IV—DENTIFRICES AND TOOTH BRUSHES

DENTIFRICES,
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Materials used to clean the teeth may as a matter of convenience, be given here under Detergents

The following list indicates those most frequently mentioned by authors —

Abutilon indicum, Don A decoction of the bark is used as a mouthwash in toothache

Acacia Catechu, Willd Cutch is recommended as a dentifrice along with charcoal

A. ferruginea DC A decoction of the bark is employed as a toothwash

A. modesta, Wall Twigs used by the Panjabis as tooth brushes

Areca Catechu Linn The burnt nuts reduced to a powder have been recommended as a dentifrice

Aristida setacca Retz According to Roxburgh the culms are used in South India as tooth picks [brushes]

Calotropis gigantea R Br & C procera, R Br Twigs used as tooth

Cassia auriculata Linn Twigs used as tooth brushes A considerable trade is done in these they are esteemed as preferable to the tooth brushes obtained from any other plant

Citrullus Colocynthus, Schrad Fresh root used as tooth brush

Cuttle fish (or Sea foam) Employed in the manufacture of tooth powder

Datura alba, Nees Powder of the seeds used to deaden pain

Daucus Carota Linn Leaf stalks employed by the hill tribes

Euphorbia antiquorum Linn Juice given in toothache

Ficus bengalensis Linn Juice given in toothache

Indigofera aspalathoides Vahl Root chewed in toothache

I. paucifolia, Delil Used in Sind by Hindus

Jasminum grandiflorum Linn Leaves chewed in ulcerations of the gums

Juglans regia Linn Bark exported to the plains used as a dentifrice

Mangifera indica Linn Leaves stalks and twigs used as tooth brushes

Melia Azadirachta Linn Twigs used as tooth brushes

Moringa pterygosperma Gertn The bark employed in toothache

Pistacia Lentiscus Linn The mastich dissolved in alcohol is employed for filling up cavities in teeth

Plumbago rosea Linn Root applied in the cure of toothache

Pontederia vaginalis Linn The root chewed in toothache [tifrice]

Prunus Amygdalus Baillon The powdered charred shell used as a den

Pterocarpus Marsupium, Roxb Gum employed in toothache

Rumex vesicarius Linn Juice given in toothache

Salvadora persica Linn Twigs used as tooth cleaners in the Panjáb

Solanum indicum Linn The root employed in toothache

S. xanthocarpum, Schrad & Wendl The fruits boiled in ghee are used by the Santals for toothache Fumigation with burning seeds is in great repute for toothache

Streblus asper Lour Twigs employed as tooth brushes

Ventilago caliculata, Tulasne Tendril worn by the Santals as a ring on the finger intended as a charm against toothache

Wrightia tinctoria, R Br The fresh leaves when chewed are said to relieve toothache

Xanthoxylum alatum, Roxb Twigs used as tooth-brushes and to cure toothache

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Zizyphus rugosa Lamk The powdered bark is employed by the Santals as a cure for toothache

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DEUTZIA, Thumb Gen Pl I 642

A genus of highly ornamental shrubs belonging to the SAXIFRAGEÆ which have come into much favour by European gardeners on account of their bunches of handsome white flowers. The rough star shaped hairs on the leaves are serviceable in place of sand paper and the timber is used as fuel. The two Himalayan species are *D. corymbosa*, Brown (the *Daloutchi*) and *D. staminea* Brown (the *Munelt* of KUMAON). *Deutsch* SIMLA *Phul Kanri* HAZARA *Phurild* KASHMIR *Sai* CHUMBA and the *Aruchi* or *Dens* of BASHIRH.

Devil's Tree and Dita Bark, see *Alstonia scholaris*, R Br Vol I, [No 870]

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Dextrine or British Gum

A chemical substance present in most grains having the formula $C_1H_{10}O_{10}$. Wheat contains 4.5% wheat bran 5.52% barley 6.55% rye-bran 7.79% malt 8.2%. In commerce the term is applied to the substance artificially produced by the transformation of starch—the granules on bursting under the influence of heat constitute British Gum. This is largely used in calico printing, paper glazing, gumming envelopes and postage stamps. It seems probable that a very large proportion of the Rice exported from India to Europe is employed in the manufacture of Dextrine. See *Oryza sativa*.

Dhal, see *Cajanus indicus* Spreng Vol II No 49.

Dhourra, a name often given to the millets collectively.

Dhub or Dub, see *Cynodon Dactylon*, Pers Vol II, No 2558.

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DIAMOND, Man Geology Ind III, pp 150 IV p 8

DIAMANT Fr Germ, Dutch DIAMANTE It Sp ALMAS Russ

Vern.—HIND *Almās* ARAB and PERS also in PERSIAN *Mas* HIRAKA SANS Adam's GREEK and LATIN

References.—Records of Geol Survey of Ind II p V 27 X 58 186 XVIII 24, XIX 109, 208 Mem of G S Ind II 65 VII 113 VIII 106, 267 XII 144, XVI 253, Four As Soc Bengal II 403 V 111 VIII 379 1057 XI 399 XIII 859 XV 390 XXXIV Pt II 13 XL Pt I 11 L 39, also Pt II 31, Four Royal As Soc VII (Old Series) by Capt Newbold pp 226 233, VII (New Series) 125 Trans R A S I 277 As Res XV 120, 125 XVIII 100 Madras Jour Lit & Sc III 120; VI 47, Trans Med & Phys Soc Calcutta II 261 264 Trans Geol Soc London 2nd Series V pp 541 568 Four Geol Soc London XI 355 Voyage John Huyghen van Linschoten in 1596 (Trans by Hakluyt Soc) II 136 Tavernier (1665 1669) Voyages II Casar Frederick 1570 (Hakluyt's Voyages), Marco Polo (13th century) Ed by Col Yule Vol II 295; New account of the East Indies by Capt Hamilton (1688 1728) Vol I XXIX 306, Ain-i-Akbari by Abul Fazi (1590) Trans by Gladwin, II 7 11 32 59 Blochmann's Trans p 480 Tusuk-i-Yah Angiri, pp 154-155 Mustapha (1758) Oriental Report London 1799 Dr Heyne (1814) Tracts London p 92 Capt Burton (1876) Quart Jour Sc New Series Vol VI 351 Mani Mala by Raja Sourendro Mohun Tagore Kelsall (1872) Bellary Dist Man p 24 Jenkins Report of Nagpur Temple Adm Rep C P 1861 62 p 124; C P Gasetter; Dr Shortt (1855) Selections Records Beng Govt Vol IV, No XXIII, p 182 Sel Records Madras Government No XIV,

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Statistical account of Bengal by Sir W W Hunter XVII, p 190 *Athen-son N W P* (1874) *Panna District* p 565 *Mason's Burma and Its People* pp 573 731 *U C Dutt Mat Med Hind* p 92 *Man Cud dapaah Dist* by Gribble p 24 *Settle Report Chanda Dist* p 4 &c &c

Where found—In India Diamonds occur over three wide areas in each of which several limited localities are more especially famed. These may be briefly stated as *first* the eastern side of the Deccan from the Penner to the Sone *second* the Madras Presidency as near Cuddapah Kar-nul Ellore but more especially in the Kistna and Godavari basins (the former of which probably afforded the Golconda diamonds a name given to them from the ancient kingdom of Golconda) and *third* Chutia Nagpore and the Central Provinces to Bundelkhand.

It is somewhat remarkable that the Indian diamonds have not as yet been found in what can be called their original matrix. Recently how-ever, they have been reported to have been discovered in the Madras Presi-dency in a peculiar rock answering somewhat to the blue rock (Peridotite) of South Africa. As matter of practical experience they are found chiefly in alluvial deposits such as in beds of sand and clay in ferruginous sand stones or in conglomerates. The best diamonds are said to be those from the Kistna district and from Panna in Bundelkhand. A further locality has been reported namely on the Himálaya near Simla and this might be the *Haima* of ancient writers. The discovery of diamonds on the Himálaya has not however been confirmed by geologists and although if established it would prove of the greatest interest geologically the reported occurrence has not as yet been productive of practical results. It may be added that none of the Indian diamond fields can at the present day be viewed as of commercial importance and it is difficult if not impossible to identify for certain all the localities alluded to by classical writers. Both practical and scientific European opinion is however in favour of the explanation that the lessened trade in modern times is more due to the conservative character of the diggers in keeping their art a secret or to the exhaustion of the surface workings which their appliances and means are alone suitable for than to the complete exhaustion or non-existence of fairly rich unexplored diamond beds. Some few centuries ago diamonds were undoubtedly more extensively produced in India than at the present day. India was indeed the first and for a long period the only source of diamonds known to the European nations. The decline which has since taken place may be due in addition to the above explanation to the discovery of the stone else where and to the application of cheaper methods of working diamond mines in other countries than are known to the people of India.

For centuries the Indian mines have been held by poor workmen who unaided by science have had to depend on their hereditary skill while battling against the adversity and persecution engendered through national disturbances that shook the empire particularly from about the period of the Brazilian discovery (1727) down to the completion of the industrial settlement under British rule. It seems probable that when peace and security were restored in India, the art of diamond washing had to a large extent been lost. At the same time it should not be forgotten that the diamonds which found their way all over the civilized world from the Indian mines—the *Adamas* of the Greek and Latin writers—may have largely represented the surplus accumulation of gems collected during many previous centuries.

Some of the oldest Sanskrit writers allude to the diamond and it appears to have been worn by the nobility of India long anterior to the earliest European mention of it. At the same time it is significant as Mr Ball points out (*Economic Geology of India* p 3) that the

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Hindus are not now and probably never were professional diamond diggers. The greater part of the Indian mines are worked by Gonds or Kóis for as Mr Ball adds the miners in South India though some of them are said to be Hindus and others are simply described as low out-castes all probably came from the same family. It may of course be said in answer to this that the mining and washing would naturally fall to the lot of Helot races but in some of the localities it is doubtful whether the Aryans ever held paramount power. It would not therefore be a great stretch of imagination to picture the aboriginal races of India using diamonds as playthings prior to the Aryan invasion as putting in fact little more value on them than the Negroes of Brazil did who employed their diamonds as counters in games of cards. The Aryans bringing with them wealth and enlightenment might be supposed to have soon given to the Indian gems their true value while leaving the art of digging in the hands of the aborigines in whose country they were found. Everything therefore points to India having always had a limited and conservative diamond mining community with whom it might be easily supposed the art under adversity would not have continued to prosper. Even assuming that the first washings of the surface beds afforded a richer yield than the subsequent re-washings of the same materials (and this is admittedly what has actually taken place) there still remains the fact that few gems have in modern times been discovered that are in any way equal to those now in the possession of the great monarchs of the world—gems the individual histories of which are lost in the obscurity of a remote antiquity. The view may thus be admissible that the Royal Diamonds have been handed down from generation to generation and that each represents an accidental discovery a it marks as period of human history. The prevalent opinion advanced by the early writers and held still by the modern Indian diggers as to diamonds growing accounts for the persistence with which the same materials have been searched over and over again and it has its explanation in the fact that the natural disintegration of the matrix brings to light stones not discovered in a former washing from their having been closely encrusted by earthy materials. But the theory of growth has been exploded both by the chemist and the European digger. The diamond is now known to be a crystalline state of pure carbon formed under geological influences of which analytical research may be said to have established the rationale but which constructive or synthetical efforts have at most only approximated towards demonstrating. We may decompose the diamond but cannot make it.

One of the older European writers who visited India and wrote of the diamond (John Huyghen van Linschoten) describes it as growing —

Diamonds he says by the Arabians and Moores called *Almas* and by the Indians where they grow *Iraa* * and by the Malaysians where they are likewise found *Itam* †. They grow in the countrie of Decam behinde Ballagate by the towne of Bisnagar wherein are two or three hills from whence they are digged whereof the King Bisnagar doth reape great profitte; for hee causeth them to be straightly watched and hath farmed them out with this condition that all Diamonds that are above twenty five Mangelyns in waight are for the King him selfe (every Mangelyn is foure graines in waight) ‡ and if anie man bee found that hideth anie such he looseth both life and goods. There is yet another

Hind Sans

* The Malay name *Iutan* comes from the Javanese *Huitan* which again is derived from the Sanskrit

† According to Mr Ball in Tavernier's time (*Econ Geol* p 27) a Mangelyn = $\frac{1}{2}$ carat or 7 grains at Raolconda and Coulour; the rat being $\frac{1}{2}$ of a carat or $3\frac{1}{2}$ grains. But 8.43 grains is more probably the correct equivalent of the Hind *rati*

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hill in the countrie of Decam which is called Velha, that is, the old Rocke (= Rocha velha—Ed) from thence come the best Diamonds and are sold for the greatest price which the Diamond grinders, Jewellers and Indians can very well discerne from the rest

These Diamonds are much brought to sell in a Faire that is holden in a Towne called Lispor* lying in the same countrie of Decam between Goa and Cambaia whither the Banianes and Gusurates of Cambaia doe goe and buy them up bringing them to Goa and other places They are very skilfull in these matters so that no Jeweller can goe beyond them but oftentimes they deceive the best Jewellers in all Christendome In this Roca Velha there are Diamonds founde that are called *Nayfes* ready cut which are naturall and are more esteemed than the rest especially by the Indians themselves In the Straight called Tania pura a countrie on the one side of Malacca† there is likewise an old rocke which also is called Roca Velha where diamonds are found that are excellent they are small but verie good and heaveie which is goode for the seller but not for the buyer Diamonds are digged like gold out of Mynes and where they digge one yeare the length of a man into the ground within three or foure years after there are diamonds founde againe in the same place which grow there Sometimes they find Diamonds of one hundred and two hundred Mangelyns and more but verie few

It may here be suggested that it is curious Linschoten did not learn of the discovery in the Deccan diamond area of any exceptionally large stones such as the Great Mogul or Koh-i-nur His remarks are of a general not a specific character The above passage has however been reproduced in full from Linschoten's Journal of his travels in India because Ball and other writers on Indian Diamonds do not appear to have consulted that work The explanatory notes are mostly those given by Burnell and Tiele in their revised translation published by the Hakluyt Society The original Dutch Edition of Linschoten's Journal is dated 1596 and the account given by Tavernier in his *Voyages*—a writer to whom most modern authors assign the first place among diamond explorers—was published about 1669 It is indeed often stated that Tavernier first made the Indian diamond famous in Europe but Marco Polo in the thirteenth century wrote of them and even Tavernier speaks of a trade existing in these gems in his time while a century before Linschoten in the passage quoted above published the fact that the Christians of Goa traded in diamonds Tavernier was perhaps the first European however who travelled over India with the express purpose of inspecting the diamond mines As the result much more precise information became current in Europe after the publication of his voyages than before He visited the Emperor Aurangzeb on the 1st November 1665 and on the next day was permitted to examine and weigh the Court jewels The largest diamond shown him he appears to have named The Great Mogul This he was informed had been obtained from the Coulour mines (Kollur in the Kistna district Madras)—mines opened out as he affirms only a hundred years before the date of his visit to India This would correspond with the date of Linschoten's visit Ball and other writers suggest that the Great Mogul was most probably known originally as the Kollur diamond but that in conformity with an Asiatic practice of corrupting meaningless names into something understood while preserving the original sound it became *Koh-i-nur* or mountain of light Mr Mallet

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* Probably Ellichpur the old capital of Berar

† Tando g Pura, the old capital of Matan on the west coast of Borneo It is mentioned by Castanheda and others as a town from which came diamonds "

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refers to the most recent large diamond found in India (1881). It came from the Bellary district and was purchased by the firm of Messrs P. Orr & Sons of Madras. When cut as a brilliant of the purest water it weighed 24½ carats. This as a kind of parody on *Koh-i-nur* received the name of *Gor-do-Norr* in honour of the senior partner of the firm Mr Gordon Orr. On the other hand many writers hold that the *Koh-i-nur* was so named by Nadir Shah (the Persian invader of India in 1739) from whose successor in 1813 it passed into the hands of Runjit Singh. In 1849 on the annexation of the Panjab it again changed hands and was presented shortly after to Her Majesty the Queen Empress of India.

On the other hand a much greater antiquity is sought to be established for the *Koh-i-nur*. A legend asserts that it was found in one of the mines in the Kistna district and was worn 5 000 years ago by Karna one of the heroes celebrated in the *Mahabharata*. It is then said to have passed through many hands until presented to Bábar the founder of the Mogul dynasty in 1526 and thus descended to Aurengzeb son of Shah Jahán. Tavernier however expressly states that it came to the Mogul Emperors in the time of Shah Jahan and it is significant also that Abul Fuzl in his *Ain-i-Akbari* while dwelling at length on the high personal character and great wealth of Akbár (the great grandson of Babar) makes no mention in the list of Court jewels of any diamond that could compare with either the Great Mogul or the *Koh-i-nur*. In the *Tuzuk-i-Jahangiri* some interesting facts are given regarding the Court jewels in Jahangir's time (son of Akbár) but no mention is made of the Great Mogul so that Tavernier's statement may be accepted as correct that it came into the hands of the Mogul Emperors during the reign of Shah Jahán (son of Jahangir). This would not however preclude the possibility of its having been in the possession of the Kings of Golconda for many previous generations or even detract from the probable accuracy of the tradition that it was once worn by Karna. Indeed the king of a region from which the majority of the great diamonds were obtained might fairly well be expected to have retained in his own family some of the best gems ever found. This is the more easily admissible when it is recollected how futile had been the efforts to conquer the diamond king and that even Shah Jahán owed some degree of his ultimate success to the treachery of Miringola.

A far greater difficulty exists in tracing the Mogul diamond after the date of its having been inspected and weighed by Tavernier. On the death of Aurangzeb the Mogul Empire rapidly fell and from 1720 it may be said to have begun the final stage of breaking up. In 1739 the Persian invader Nadir Shah overthrew what vestiges remained of the Great Muhammadan Empire—an empire that had lasted for over two hundred years *vis* from Bábar to Muhammad Bahádar Shah the last of the race of Timur. The Persians sacked the city of Delhi and carried off money and treasure to the value of 32 millions sterling including the Great Mogul Diamond.

Tavernier does not however say that that gem was found a hundred years before the date of his visit to Aurangzeb but that the Coulour mines were opened out then. The great diamond might have been picked up centuries before although as pointed out above Linschoten's silence as to the existence of any one exceptionally large diamond might be accepted as leading to an opposite inference. Some capital has been made out of Tavernier's contradictory statements regarding the weight of the gem when presented to Shah Jahán—in one place 900 ratis = 787½ carats in another 907 ratis = 793½ carats. But it should be borne in mind that that was only the weight he was told it then possessed and he may be

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<p>pardoned a discrepancy which after all is not of serious consideration. When shown to him it had been cut and he is perfectly consistent in stating wherever he alludes to it that on his weighing it he found it to be 319$\frac{1}{4}$ ratis or 280 carats. A good deal of discussion has taken place also as to whether Tavernier's Great Mogul Diamond of 280 carats was one and the same with the Koh-i-nur. Some writers affirm that during the time it was in the possession of the Persians it was cut or broken by cleavage and that from the Great Mogul was derived the Orloff diamond and also a gem still in the possession of Persia. The Orloff diamond now in the sceptre of the Emperor of Russia is in the form of a half pigeon's egg and weighs 194$\frac{1}{4}$ carats. The Koh-i-nur when it came to England weighed 180$\frac{1}{2}$ carats and might be described to have been a defective half egg. It has since been cut in the rose and weighs 106$\frac{1}{8}$ carats. If the removed portion from the top of the Koh-i-nur were accepted as corresponding with the Orloff gem the latter should have weighed considerably less than the former and if a lower portion of the Koh-i-nur gave origin to the Orloff gem it would be difficult to account for its shape as that of a half egg. But reasoning on these lines goes on the assumption that to account for the Orloff and Koh-i-nur as parts of one original diamond they were parts of the diamond as seen and figured by Tavernier. It would seem that this idea has so pervaded the writings of authors who have treated of this subject that the fact that the stone presented to Shah Jahán had been reduced from 787 to 280 carats has been lost sight of. It is just possible that the severe treatment bestowed on the Venetian Hortensio Borgio who cut the stone for the Mogul Emperor was because of a well founded suspicion that he had cut off large pieces which were never accounted for. If this supposition be admissible then the Great Mogul gem with small pieces chipped off it while in Persia might easily be accepted for the diamond known as the Koh-i-nur while the somewhat mythical story of the Orloff having been picked off a Hindu idol might be viewed as the manner in which the largest of all diamonds was again restored to public notice. The person who cut the Great Mogul in the form of a half egg might have followed the same method in forming the Orloff. All this is however pure speculation and the main interest rests in the fact that the Koh-i-nur the Orloff the Pitt or Regent and most of the other great historic diamonds have been obtained from India.</p> <p>PRESENT POSITION AND FUTURE PROSPECTS OF THE INDIAN DIAMOND FIELDS—It has already been stated that large diamonds in any way comparable to those discussed above have not been found for many generations. Various reasons have been suggested for the decline of the Indian industry and it is perhaps only necessary in this place to state that the subject seems likely to attract much greater attention in the future. An expert has recently been examining the Hyderabad diamond fields and while a definite report has not as yet been issued by him the Deccan Company have had a hopeful forecast placed before them. It is perhaps unnecessary to quote here a complete series of notices regarding the diamond fields that are actually being worked. A few may however be mentioned premising that nearly every writer states that the trade is unimportant the contractors often losing heavily and the labourers earning only a precarious livelihood.</p> <p>MADRAS—In the <i>District Manuals</i> and the <i>Imperial Gasetteer</i> brief notices occur regarding the diamonds found at the present time in the Madras Presidency. These seem to be summarised in the following passage taken from the <i>Manual of the Madras Administration</i> for 1885— "The diamond bearing sandstones and conglomerates are of considerable</p>	<p>HISTORY</p> <p>Orloff 369</p>
	<p>POSITION AND PROSPECTS 370</p> <p>Madræs. 371</p> <p>D 371</p>

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extent in the Kurnool basin especially on its western side. They have been mined at Bunganapully Moonimadoogoo and Gooramcondah in the latter district. At Ramalcottah and several other places in Kurnool district diamonds were and are still obtained by washing local alluvia formed of the *débris* of the diamond conglomerate. At and near Chenur in Cuddapah district the gravel beds in the alluvium of the Pennair river which consists largely of *débris* of rocks belonging to the Karnool system were formerly washed on a large scale though now almost abandoned. Considerable tracts of the diamond conglomerate—the Bunganapully conglomerates of the Geological surveyors—have been left untried as yet by the native miners. Conglomerate beds belonging to the Cuddapah system were formerly mined for diamonds in the Kistna district where deserted villages occur in great numbers to the north and west of Chintapully. To this set of mines belonged the old workings at Collor on the Kistna which has been identified on good grounds with the Ganı Coulour of Tavernier where the Koh-i-nur was obtained. The Ramalcottah and Bunganapully mines and workings appear still to yield a remunerative supply of small and rough diamonds the right to mine being sold at a yearly auction. The so called Golcondah mines either of Gollapully near Ellore or in some parts of the Golcondah range of the Eastern Ghats north of Rajahmundry have been long deserted.

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NIZAM'S DOMINIONS — When the Nizam ceded the Northern Circars to the British he was permitted to retain possession of all the village lands of this area in which diamond mines were situated and these villages now stand isolated in the British Kistna and Godavari districts. The revenue derived from them by the Nizam at present from ordinary agricultural resources is not inconsiderable but the diamond mines yield little or nothing. Eighty years before Heyne's visit or about the beginning of the eighteenth century they belonged to a powerful zamindár called Ooparow but on his discovering the diamonds they were taken possession of by his sovereign the Nizam. Some of these mines have already been alluded to such as the Kollur (Color). In that mine it is now generally believed the Koh-i-nur was found and not at Partial though it seems fairly certain the Pitt gem was found at the latter. The expert presently examining the mines in Hyderabad has published certain facts of interest. His communication has been discussed as follows in the *Pioneer* — The workings are very extensive some being five miles in length. They are all of a superficial character not extending below 15 feet from the surface. Wherever water or rock was met the native workers could not compete with the difficulty. The soil indications are said to be extremely satisfactory and in many places similar to those found at Kimberley and elsewhere in South Africa. Although the diamond workings have not been carried on since the beginning of the century a few individuals still employ themselves in re-washing the old *débris* and the expert was shown one or two small diamonds found by them of fairly good colour. The report alluded to describes the primitive method pursued in washing and sifting for the diamonds the information given being concluded with the following — By the 26th January the expert had again started from Secunderabad for Purtyal with a convoy of 80 bullock carts carrying all the necessary machinery for testing and working the different places described by him. He states that he hopes to be able shortly to send a further report in the shape of a parcel of diamonds. He adds — It is of course not in my power to be able to say with any certainty that I shall find diamonds in payable quantities but I do not suppose for one moment that the diggings are worked out particularly as the natives have not worked the ground regularly but have left ground untouched between

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all the pits which is of the same soil and therefore just as likely to be diamond bearing as the pits themselves. He concludes I have every confidence in the venture but do not like to be over-sanguine and as it will not be very long before the ground will be thoroughly tested I prefer to confine myself to saying that the chances are very much in favour of everything turning out satisfactorily. It may be of interest to you to know that in all the Kistna villages excepting Purtyal which is on the high road there has never in the memory of living men been a white man so that proves plainly that no prospecting or anything of that kind has taken place within the last 80 or 90 years. With regard to working any of these places there are no difficulties of any kind labour can be very easily obtained also fuel and water and should the pits full now be required at once it would be an easy matter comparatively to drain and pump them dry.

CENTRAL PROVINCES SAMBULPUR DISTRICT — Some uncertainty Mr Ball states exists as to how far the early notices of the diamond-bearing localities of Gondwana are applicable to those situated in the Mahanadi basin. The first visit to Sambulpur of which there is any published account is described in the narrative of a journey which was undertaken by Mr Motte in the year 1766. The object of this journey was to initiate a regular trade in diamonds with Sambulpur Lord Clive being desirous of employing diamonds as a convenient means of remitting money to England. His attention had been drawn to Sambulpur by the fact that the Rajah had a few months previously sent a messenger with a rough diamond weighing 16½ carats as a sample together with an invitation to the Governor to depute a trustworthy person to purchase diamonds regularly. The Governor proposed to Mr Motte to make the speculation a joint concern in which writes the latter I was to hold a third he the other two all the expenses to be borne by the concern. The proposal dazzled me and I caught at it without reflecting on the difficulties of the march or on the barbarity of the country &c. In spite of his life being several times in danger from attacks by the natives the loss of some of his followers by fever and a varied chapter of other disasters Mr Motte was enabled to collect a considerable amount of interesting information about the country. Owing to the disturbed state of Sambulpur town however he was only able to purchase a few diamonds.

The next account is Dr Voysey's who visited the diamond washings in Sambulpur in 1823 when on his last journey from Nagpur to Calcutta. He states that diamonds were only found below the junction of the Ebe river with the Mahanadi but other authorities place the limit much further up namely at the junction of the Mand and Mahanadi rivers. The miners were at work in the channel between the island and the right bank about 10 miles above Sambulpur. In the Medical Topography of the districts of Ramgurh Chutia Nagpur Sirgooja and Sambulpur (dated 1825) further additional information is given regarding the Sambulpur diamonds which fixes the diamond region on the north side of the river. A large stone is said to have been found in 1809 in these mines. This is reported to have weighed 210.6 carats and to have fallen treacherously into the hands of the Mahrattas. Nothing further has been heard of this stone, but it is presumably one of the great gems the history of which is lost. The Central Provinces Gasetteer upon what authority is not known affirms that the diamonds of Sambulpur are flat and thin and have flaws in them. Some of the older writers on the contrary state that along with the Chutia Nagpur stones they were of the best quality and the purest water. In the Imperial Gasetteer it is simply stated that diamonds are occasionally found near an island called Hirakuda or diamond island. When Sambul

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pur was finally taken over by the British in 1850 the Government offered to lease out the right to search for diamonds and in 1856 a notification appeared in the *Gazette* describing the prospects in somewhat glowing terms. For a short time the lease was held by a European at the low rate of Rs200 a year but it was soon given up. Mr Ball adds that though reports are often made of diamonds found at Sambulpur recent local inquiries failed to elicit a single authentic case and the gold washers asserted that these statements were incorrect.

Of the mines in the Chanda district it may be said that although these are of considerable extent and are most probably the Bairagarh mines mentioned in the *Ain-i-Akbari* Mr R Jenkins in his report on the territories of the Rajah of Nagpur states that they were formerly celebrated but in his time did not yield sufficient returns to make them worth working.

Bundelkhand
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BUNDELKHAND PANNA—In the *North Western Provinces Gazetteer* (Vol I *Bundelkhand* p 565) will be found a detailed account of the past and present of the Panna diamond mines. This has been condensed and reproduced in the *Imperial Gazetteer* as follows—The ground on the surface and for a few feet below says Mr Thornton from whom this paragraph is compiled consists of ferruginous gravel mixed with reddish clay and this loose mass when carefully washed and searched yields diamonds though few in number and of small size. The matrix containing in greater quantity the more valuable diamonds lies considerably lower at a depth varying generally from 12 to 40 feet and is a conglomerate of pebbles of quartz jasper hornstone Lydian stone &c. The fragments of this conglomerate quarried and brought to the surface are carefully pounded and after several washings to remove the softer and more clayey parts the residue is repeatedly searched for the diamonds. As frequently happens in such speculative pursuits the returns often scarcely equal the outlay and the adventurers are ruined. The business is now much less prosperous than formerly but Jacquemont did not consider that there were in his time any symptoms of exhaustion in the adamantiferous deposits and attributed the unfavourable change to the diminished value of the gem everywhere. The rejected rubbish if examined after a lapse of some years has been frequently found to contain valuable gems which some suppose have in the interval been produced in the congenial matrix but experienced and skilful miners are generally of opinion that the diamonds escaped the former search in consequence of encrustation of some opaque coat and have now been rendered obvious to the sight from its removal by fracture friction or some other accidental cause. More extensive and important than the tract just referred to is another extending from 12 to 20 miles north-east of the town of Panna and worked in the localities of Kamariya Brijpur Bargari Maira and Etwa. Diamonds of the first water or completely colourless are very rare most of those found being either pearly greenish yellowish rose-coloured black or brown. Sir W W Hunter adds that according to Pogson inexhaustible strata producing diamonds exist here. None of the great diamonds now known appear to be traceable to the mines in Panna and Tieffenthaler mentions it as a general opinion that those of Golconda are superior. During the prosperity of the mines a tax of 25 per cent was levied on their produce, but the tax now imposed is stated to exceed this rate. The revenue is divided in proportions between the Rajahs of Panna and Char khari. The value of the diamonds still found in the mines is estimated at £12 000 per annum. Mr Ball gives a brief account of these mines written by Mr Medlicott and a picture of the miners at work in a shaft as seen by the late Mr Jules Schaumburg.

The Diamond, Clove Pink and Carnation

(G Watt)

DICHOPSISIS

BENGAL CHUTIA NAGPUR—Repeated reference has been made to the diamonds found in Chutia Nagpur. Space cannot however be afforded to deal in full with the mines that are said to have existed nor even to do justice to the historic references to them. But they are not generally regarded as of much importance. Mr Blochmann's paper on the subject of Kokrah (= the ancient name of Chutia Nagpur) is however of very great interest. The diamonds possessed by Akbar and his son Jahangir are said to have been largely drawn from the mines in Chutia Nagpur. The reader is referred to Mr Ball's detailed account of Indian diamonds in the *Manual of the Geology of India Vol II pp 1-58*.

Medicine—Diamond dust is known to be a powerful mechanical poison. In Hindu practice it is however to some extent used as a drug. Dutt says that according to Sanskrit authors the diamond for medicinal purposes is purified by being enclosed within a lemon and boiled in the juice of the leaves of *Sesbania grandiflora*. It is reduced to a powder in the following manner. A piece of the root of a cotton plant is beaten to a paste with juice of some betel leaves. Both these vegetables should not be less than three years old. The diamond is enclosed within this paste and roasted in a pit of fire. The process is repeated seven times when the stone is easily reduced to a fine powder. Another process consists in roasting the diamond enclosed in a paste made of horn shavings for three times in succession. The diamond thus prepared is said to be a powerful alterative tonic that improves nutrition, increases the strength and firmness of the body and removes all sorts of disease. Dose about one grain.

SPECIAL OPINION—§ Employed as a poison it is administered in the shape of dust as in the late celebrated case when the Resident of Baroda Sir Arthur Phayre nearly lost his life. (*Surgeon Major F E T Atchis son Simla*)

DIANTHUS, Linn Gen Pl I 144**Dianthus Caryophyllus**, Linn Fl Br Ind I 214

THE CLOVE PINK and CARNATION

Habitat—In the *Flora of British India* the Panjab at Attok is mentioned doubtfully as a locality for this plant.

The Pink and Carnation are cultivated all over India in gardens especially on the hills and *D chinensis* Linn is practically a naturalised weed of cultivation springing up in native gardens from self sowings all over the plains. The young flower buds of these plants from their resemblance to a nail (*Clou* FR *Clout* ENG) were early known as cloves and the leaves being like those of a *Carex* obtained the name **CARYOPHYLLUS** from their cutting the hand and giving origin to caries or sores. The cloves of modern commerce by a play on these names became **Caryophyllus aromaticus** which see Vol II p 202.

Diaphoretics, see **Medicine****DICHOPSISIS**, Thw Gen Pl II, 658

A genus of trees or shrubs containing some 30 species natives of South India, the Malay peninsula and islands with one species in Samoa. India as accepted by Sir J D Hooker in the *Flora of British India* possesses fifteen species of which only three or perhaps four are natives of India proper the others being either Malacca or Ceylon plants. By tapping these trees a gum like juice is obtained the better qualities of which constitute the Gutta percha of commerce (see **D Gutta**). It may here be added that while the more elastic substance—

**POSITION
AND
PROSPECTS.**
Bengal
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MEDICINE.
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**DICHOPSIS
elliptica****Indian Gutta percha**

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Dichopsis elliptica, Benth Fl Br Ind III 542 SAPOTACEÆ

India rubber—is obtained from several widely different plants Gutta percha proper is only obtained from the Sapotacea family and mostly from one or two species of DICHOPSIS the inferior forms obtained from other plants can at most be called Gutta percha substitutes

Syn—*BASSIA ELLIPTICA* Dals *ISONANDRA ACUMINATA* Drury *Useful Plants (not of Gardner)*

Vern—*Panchoti palu* BOMB *Panchoti pala* TAM *Panchonta* KAN

References—*Beddome Fl Sylv t 43 Gamble Man Timb 242 Dals & Cils Bomb Fl 139 Cleghrn Memorandum on Panch tee or the Indian Gutta tree Drury U Pl 260 Li boa U Pl Bomb 90 Cooke Oils and Oil seeds 8 B l f ur Cycl p 1 289 II 387 Indian Forester III 24 VIII 208 Kew Report for 1881 p 44 Man Comm latore Dist 41 Madras Man of Administ Vol II 105 Tropical Agriculturist 1883 p 960*

Habitat—A large tree of the Western Ghâts extending from Bombay to Kanara, and ascending to an altitude of 4 000 feet **Beddome** says it is a common tree in all the moist sholas of the Western Ghâts also in the Wynad Coorg Travancore &c

Gum—This tree yields the Indian Gutta percha or *pala* gum a substance which has attained a certain amount of popularity as an adulterant for Singapore Gutta It is stated that as much as 20 to 30 per cent may be used without the characteristic properties of the Gutta percha being destroyed To **Mr Lascelles** and **General Oullen** should be attributed the honour of having brought this substance prominently before the public the latter gentleman recommended amongst many other uses its adaptability as a cement **Balfour** describes the juice as obtained on tapping the trees—a process quite different from that resorted to in the Malay Peninsula with Gutta percha The following passage from *Drury's Useful Plants of India* gives a full account of this substance—

The exudation from the trunk which has some similarity to the gutta percha of commerce is procured by tapping and the quantity is not inconsiderable but it would appear that the tree requires an interval of rest of some hours if not days after frequent incision In five or six hours says **General Oullen** upwards of 1½ lb (more than a catty) was collected from four or five incisions in one tree Again he writes in the same month (April) Incisions were made in forty places at distances nearly 3 feet apart along the whole trunk The quantity produced was 2½ *dungalies* (a *dungaly* is about half a gallon) the reeds were placed again but in the evening no more milk was found but the bark is thin and the juice soon ceases to flow although there is plenty of it in the tree The gum when fresh is of a milky white colour the larger lumps being of a dullish red Specimens of the gum were forwarded to England to be reported on by competent persons and on an analysis of its properties **Messrs Teschemacher & Smith** stated It is evident that this substance belongs to the class of the vegetable products of which caoutchouc and gutta percha are types and that it greatly resembles bird lime in its leading characteristics but in a higher degree It is evident that for water proofing purposes it is (in its crude state) unfit for all though the coal tar oil of turpentine paste might be applied to fabrics as similar solutions of caoutchouc now are and a material obtained impervious for a time to wet yet that owing to the capacity of this substance to combine with water and become brittle in consequence at ordinary temperatures such a water proofed fabric would become useless very quickly We do not of course in any way imply that in the hands of some inventors this and other difficulties to its useful application may not be over-

GUM
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D 380

The Gutta percha.

(G Watt)

DICHOPSIS
Gutta

come Although unfit for waterproof clothing moveable tarpauling and the like yet it might be usefully employed to waterproof fixed sheds or temporary erections of little cost covered with calico or cheap canvas but there are already a numerous class of cheap varnishes equally adapted for such a purpose so that as a waterproofing material it is but advisable for the present to look upon it as useless

Its perfume when heated might possibly render it of some value to the pastille and incense-makers

Its bird lime sticky quality might be made available by the game-keeper and poacher in this country for taking vermin and small birds we almost doubt whether a rabbit hare or pheasant could free itself if hair feathers or feet came in contact with it We think it might be usefully and more legitimately employed by the trapper for taking the small fur bearing animals turpentine would cleanse the soiled furs The only extensive and practical use however in this country to which we at present think it may probably be with advantage applied is as a sub aqueous cement or glue We beg to forward you some deal wood glued together with this substance melted and applied hot which we have now kept under water for several days and two fragments of glasses which have been similarly treated You will observe that the cement has hardened at the edges but probably without injury to its cementing properties We have no reason to think that it would not rot under water more rapidly than wood does but experience must be the sole guide here We have reason to think such a glue or cement would be readily tried and if found good employed by joiners and others

Oil—It yields the Gutta percha Seed Oil

Structure of the Wood—Beddome says the timber is hard and not unlike Sál in its grain it takes a good polish is much employed by planters for building purposes and might be used for furniture

Dichopsis Gutta, Bth & Hook f Fl Br Ind III 543

GUTTA PERCHA

Syn —ISONANDRA GUTTA Hook

Vern —Niatu taban MALAY

References—B andis For Fl 286 Gamble Man Timb 242 Christy Com Pl and Drugs 1885 No 8 p 17 Cooke Oils and Oilseeds 14 Balfour Cyclop II 388 Smith Dic 204 Kew Off Guide to the Mus of Ec Bot 38 Kew Off Guide to Bot Gardens and Arboretum 69; Madras Manual of Administration Vol I 360 Indian Forester VIII 205 Journal Agri Hort Soc Ind Vol II 101 (Analysis of Gutta tuban) III 146 Vol IV 59 app Vol IV 221 VI app 50 Vol X Correspondence and Selections p 13

Habitat—A tree attaining a height of 40-80 feet met with in Malacca and Singapore and distributed to Sumatra It is said to flourish best on the hill sides around Perak but it is rapidly being exterminated from all accessible situations Since the process of extracting the sap necessitates the killing of the tree unless practised under the most scientific system of forest conservancy in which periodic renewal accompanies felling extermination becomes a matter of time and it is feared this is what to a large extent has actually taken place

Gum.—This is said to afford the best quality of Gutta percha The following brief abstract will be found to set forth the main facts known regarding this substance and to exhibit the plants which either yield the commercial article or which might be utilised as substitutes Most of these are either grown in India or might easily be introduced

Oil—The oil from this plant was reported on by the Madras Jurors at

GUM

OIL
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TIMBER
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383

GUM
384

OIL
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D 385

DICHOPSIS

Commercial Gutta percha

TIMBER
386
387

the Exhibition of 1857 A vegetable butter is said in Sumatra to be prepared from the seeds

Structure of the Wood—Soft fibrous spongy, of a pale colour and marked with black lines

GUTTA PERCHA

References—*Kew Report for 1881 gives a long account of Gutta-percha which has been freely consulted in drawing up the present abstract* Spens *Encyclopædia Journal of the Agri Hort Soc Government of India Proceedings* Baden Powell, *Panjab Products Indian Forester Vol VIII* 205 209 *Encyclopædia Britannica Vol XI Tropical Agriculturist (numerous articles in the volumes for the past four or five years)* *British Manufacturing Industries (Stanford's series)* by Collins; *Society of Arts for 1844 Dr Montgomerie's Lecture on the Discovery of Gutta percha* *Balfour Cyclopædia of India M C Naudin in Bulletin Minist de L'Agric Paris Dec 1888 &c &c*

A commercial term for the inspissated milky sap of several plants of which nearly all (or at least all the important ones) belong to the natural order SAPOTACEÆ The word gutta percha is of Malayan origin it signifies the gum or gutta of the tree known as *percha* The gutta-percha of commerce is however chiefly the *gutta taban* or **Dichopsis Gutta** a tree of Perak As it reaches the market the gum is largely adulterated often consisting of the inspissated saps of some five or six different plants mixed together of which a fig and a bread fruit tree which yield inferior India rubbers are probably the most frequently used Gutta percha seems to have come into commercial notice in Europe in the year 1845 (from the Straits) its important uses soon causing an immense demand It was probably known as *maser wood* at a much earlier date and in 1822 Dr W Montgomerie experimented with it and in 1844 read a paper on the subject before the Society of Arts London From that date it became a regular article of commerce It is principally employed in coating telegraphic cables owing to its being a perfect insulator while it is of such a nature as to withstand in a remarkable degree the action of water It is in fact much more durable when entirely submerged than when exposed to a moist atmosphere About 10 years have been stated to be the period it will withstand the variations of climate in the air 20 years if enclosed in iron tubes but 20 years when it has been submerged have no appreciable effect upon the article This is due to the fact that under the influence of light and air it slowly becomes oxidised being converted into a brittle resin soluble in hot alcohol This is the great defect of Gutta percha for when oxidised it loses its plastic nature Under water and at great depths in the sea it is however very durable hence its value as an insulator for submarine cables Chemically gutta percha is almost identical with India rubber but it differs physically being tough and inelastic

Since the date Gutta percha was made known to Europe perhaps no substance has developed more rapidly and with India rubber its uses may be said to be so many and so important as to make it perfectly indispensable to commerce

The immense demand has caused an extended enquiry all over the globe with the view of expanding the field of supply or discovering substitutes in sufficient abundance likely to meet the demand without endangering the extermination of the supply of plants As far as Gutta percha is at present concerned there cannot be a doubt but that a few years more will suffice to eradicate the supply from the Straits Settlements It has been estimated that to meet the shipments of gutta percha from Sarawak alone during the years 1854 75 over 3 000 000 trees were felled Great Britain imported in 1880 from the Straits Settlements 62 862 cwt of gutta percha valued at £505 821 The expansion of the trade may be said

Gutta percha Substitutes

(G Watt)

DICHOPSIS.

to be demonstrated by the fact that in 1876 the imports were only 19 665 cwt but were two years later 49 387 cwt The present total annual trade in gutta percha has been estimated at 10 000 000 lb The future prospects are alarming and such that not only should the Colonial Government take the most decided steps within its power for the preservation of the plants but a response to the demand should if possible be made in India There does not for example seem any very great reason why our coast forests should not to some extent be made to yield gutta percha There is nothing to show that the plant would not thrive in many parts of India if once successfully introduced Gutta percha sells at from 6d to 3s and 6d a lb

Inspissated
Sap

Another interesting feature which the increasing demand for Gutta percha must solve is the possibility (in a simple way) of transforming the milky saps of some of the numerous wild plants of India so as to render these serviceable as gutta substitutes It need only be here added that the difference between Gutta percha and India rubber is of a practical more than chemical nature and consequently from the juices not having been severally tested and reported on it is impossible to draw up a list of plants of the former that may not hereafter be found to include some of the latter The reader should therefore consult the account given under India rubber as well as the detailed descriptions furnished of each plant in their respective alphabetical places in this work The following abstract may however prove useful —

1 *Achras Sapota* Linn, SAPOTACEÆ (See Vol I A No 376 page 80)
THE SAPODILLA OR SAPOTA TREE

Largely cultivated on account of its fruit in Bengal yields the Mexican chicle gum a substance closely resembling gutta percha In the *Journal of the Agr Horticultural Society of India* Vol III 147 a long account of this Gutta percha will be found including its chemical analysis A passage from the account there given may be here reproduced — Its juice differs very remarkably by the absence of adhesiveness to which peculiarity indeed it owes its value This promises to be considerable for a vegetable product which softens by hot water while at the same time it is capable of being moulded into any shape that afterwards hardens (in which state it is not acted on by a hot or moist climate) so as to be preferable to horn for the handles of axes is capable of extensive application

2 *Alstonia scholaris*, R Br APOCYNACEÆ (See Vol I A No 872 page 198)

One of the many forms of this tree has recently been discovered to be the source of the *Gutta pulei* of Singapore The *Satian* has long been known in India as yielding an inferior India rubber but it is doubtful if this could be regarded as anything more than an adulterant for Gutta percha

3 *Bassia Mottleyana*, De Vries SAPOTACEÆ (See Vol I B No 281, page 416)

A tree of Malacca and Borneo known in the vernacular as *kotian* Mr Mottley says that this tall and straight tree when wounded yields a copious flow of milky juice which hardens to a brittle waxy resin readily softened by heat This has been described as an inferior kind of gutta percha

4 *Calotropis gigantea*, R Br ASCLEPIADEÆ (See Vol II No 171 page 35)

The *madar* or *akanda* a plant scarcely to be distinguished from the following species the properties and uses of which are identical and these plants may therefore be discussed jointly *C gigantea* is most abundant in the Lower Provinces and Eastern India, while *C procera* is the species chiefly met with in Upper or Northern and Central India

DICHOPSIS
Gutta**Commercial Gutta-percha****Inspissated
Sap****5 Calotropis procera R Br****Reference**—*Agri Hort Soc Ind VIII 107 226 231*

The inspissated and sun dried milky sap from the stem resembles Gutta percha. The *madar* is in fact the most interesting and most hopeful plant not belonging to the natural order SAPOTACEÆ which can be said to yield a substance resembling Gutta percha ever likely to obtain a commercial reputation as a Gutta percha substitute. Mr Liotard publishes in his Memorandum on the Materials in India suitable for the Manufacture of Paper the opinion of Professor Redwood upon *Madar gutta*. The Professor considers that it possesses many properties in common with the Gutta percha of commerce. The specimen so reported upon was collected by Captain G E Hollings Deputy Commissioner Shahpur (in the Panjáb) in the year 1853 little more than one year after the date of the original discovery of this Gutta. We have learned nothing further in 30 years and uncountable riches of fibre and gum may have all the while been wasting along every roadside and over every rubbish heap.

6 Dichopsis elliptica Benth SAPOTACEÆ

The *panchoti* a large tree of the Western Ghats yields the Indian gutta percha.

7 D Gutta Benth & Hook

It is said that the finest quality of all the guttas is the *Gutta susu* obtained from a botanically undetermined plant. This is very scarce but the best commercial quality is that obtained from **D Gutta**.

There are two forms one with red flowers known as *tuban merut* and the other with white flowers *tuban pateh*. The young trees require shade and a rich well drained soil hence the preference for hill sides. No special period is observed for collecting the gutta but it is said to be generally collected at the close of the rains. Full grown trees say 20 years old are hewn down and tapped all along at distances of 18 inches. The yield is so variously stated that it does not seem desirable to quote the contradictory reports. A mistake seems often to have been made between the yield of sap the yield of fresh gutta percha and the yield of dry gutta percha. The weight of sap would of course be far greater than that of gutta percha and on drying the commercial article loses as much as 30 per cent of its weight. It seems probable that the yield of dry gutta percha per tree may average from 2 to 14 lb. The sap is of course drawn from the middle layer of the bark the region of laticiferous vessels. The fresh milk or latex appears under the microscope as an emulsion a clear liquid having in it minute globules of caoutchouc. It is supposed that the caoutchouc is held in suspension in the juice through the agency of ammonia. At all events many of the fresh milky saps like that of gutta percha have an ammoniated odour and the addition of a little ammonia prevents the natural coagulation due to evaporation. The value of a Gutta percha or India rubber depends on the proportion of caoutchouc granules which it contains and on the relative absence of certain oxidised viscid resinous substances soluble in alcohol. The formation of such materials is greatly prevented by a rapid evaporation of the milk. The crude sap if in small quantities may be concreted by rubbing between the hands but it is more expeditiously accomplished by boiling.

Singapore and Penang are the chief collecting depôts.

8 D obovata, Clarke

An evergreen tree of Tenasserim extending to Malacca and Penang. According to Kurz it yields gutta percha.

9 D polyantha, Benth

Vern—*Tali BENG Sill kurta CACHAR*

Gutta-percha Substitutes

(G Watt)

DICHOPSIS

A tree 30 to 40 feet in height occurring in Sylhet Chittagong and Pegu Kurz remarks that it produces a good quality of gutta percha in large quantities

10 *Gutta Sundek* the second best commercial form of gutta percha is at present unidentified It occurs abundantly in the Malay Peninsula M Beauvisage named it as *Keratephorus Leeri* Husk but the Kew authorities regard this as incorrect and Dr Trimen who in the Ceylon Botanic Gardens has succeeded in obtaining young seedlings thinks it may prove a species of *PAYENA*

11 *Dyera costulata* Hook f APOCYNACEÆ and

12 *D laxiflora* Hook f

Trees which inhabit the forests of Malacca Singapore and Sumatra They are said to yield the *gutta jelutong* of commerce a form of India rubber

13 *Euphorbia trigona* Haworth EUPHORBIACEÆ

Syn — *E CATTIMANDOO* Elliot *Fl Br Ind V* 256

Vern — *Katimandu* TAM

This yields the *Catimandu* cement of the Madras Presidency used to fasten knife handles It contains sufficient caoutchouc to make it a profitable source of supply if not of india rubber at least of gutta percha Specially recommended by Sir Walter Elliot at the Great Exhibition 1851 where a medal was awarded to the exhibitor

14 *E nerifolia*, Linn

Syn — *E LIGULARIA* Roxb *Fl Br Ind V* 255

Vern — *Mansa sij* or *Sij*

Yields a milky sap which on drying much resembles gutta percha and for which there seems every probability of its being used as a substitute See a long account of the properties of this gutta percha in the *Four Agri Hort Soc VIII* pp 223—226

15 *E pulcherrima* Willd (= *Poinsettia pulcherrima* a common garden plant with large red bracts)

Dr Riddell recommends this as also the next species as suitable for the preparation of gutta percha

16 *E resinifera* (described in *Smith's Dictionary of Economic Plants*)

This plant yields the gum known as *Euphorbium* now largely employed as an anticorrosive paint for the bottoms of ships it comes chiefly from Morocco and Barbary Its resisting the action of water depends upon its resemblance to gutta percha

17 *E Tirucalli* Linn *Fl Br Ind V* 254

Vern — *Lanka sij* BENG *Sehud* HIND *Tiru kali* MAL *Sha soung leknyo* BURM

A small tree cultivated throughout India and used as a hedge

Dr Riddell states that this yields a fairly good gutta percha

18 *Mimusops Balata* Garin f

This tree is somewhat allied to the *SAPOTA* but it yields more freely a gutta percha sap It is a native of British French and Dutch Guiana British Honduras and Brazil flourishing best on river banks It is said to afford the best of all known substitutes for the true gutta percha of commerce and to be especially useful for submarine cables The sweet milky sap obtained from it was at first used as food by the natives but in 1860 it was employed in the preparation of its contained caoutchouc since which date a considerable trade has developed in the article See *Tropical Agriculturist* 1883 p 959 *Indian Agriculturist* Nov 20th 1886 *Four Soc of Arts* Feb 26th and March 4th 1864 *Bulletin Ministère de L'Agri Paris* Dec 1888

Milky Saps

**DICHOPSIS
poyantha****Gutta percha****GUM****19 Payena Maingayi C B C SAPOTACEÆ**

A tree of Malacca and Penang said by Maingay to abound in gutta percha also **P Leeri**, from which it is stated the *Gutta Sundek* is obtained

388**Dichopsis Helferi, Clarke Fl Br Ind III 542**

Habitat—A closely allied tree to **D obovata**, and may be the plant referred by **Kurz** to that species It is a native of Tenasserim and Tavoy

GUM

Gum—Is reported to yield a good quality of Gutta percha

389**D obovata, Clarke Fl Br Ind III 542**

Syn—ISONANDRA OBOVATA Griff

References—*Kurz For Fl Burm II 120 Balfour Cyclop II 387*

Habitat—A large tree which **Kurz** says occurs in the tropical forests of Tenasserim but to which the *Flora of British India* assigns the habitat of Malacca and Singapore remarking that imperfect specimens of what appears to be the plant were collected by **Falconer** at Moulmein

GUM

Gum—**Kurz** writes that it yields a fair sort of Gutta percha

391**D polyantha, Benth and Hook f Fl Br Ind III 542**

Syn—BASSIA POLYANTHA Wall ISONANDRA POLYANTHA *Kurz (119)*

Vern—*Tali BENG Sill kurta CACHAR Thainban MAGH*

References—*Gamble Man Timb 242 Ind Forester IX 427 XI 319*

Habitat—A moderate sized evergreen tree met with in Cachar Chit tagong and Arakan

GUM

Gum—**Kurz** says it produces a good quality of Gutta percha in large quantities—probably little inferior to that of Singapore The Conservator of Forests Assam in a letter to the Inspector General dated 10th November 1884 reported that this tree was well known to the people of Cachar and Sylhet but although he had often asked the people about its yielding Gutta percha he had never heard of it being extracted or made use of except that it is mixed sometimes with India rubber and in doing so the people of course sell themselves as they always get much less for mixed rubber than for pure I have referred the matter to the Deputy Commissioner of Sylhet and the Cachar Forest Officer to make sure I have ordered the Cachar Forest Officer to make an experiment to ascertain how much a tree will yield and to let me have the stuff collected to allow of its being valued

393

The following is the result of the above experiment but the writer has not been able to discover the report if obtained of the commercial value of the Gutta percha collected in Cachar—

Yield.

I had 36 trees tapped giving a yield of 15 pounds of dry Gutta percha To ascertain the yield per tree I have recorded the yield of six trees the tapping of which was personally superintended by me The milk was weighed directly it was taken from each tree separately Then the whole was boiled down in an iron pan over a slow fire The result is that 6 seers 11 chattacks of milk yielded $2\frac{1}{2}$ seers of Gutta percha or one-third the weight of milk The Forest Officer seems thus to have tapped the trees after the same manner as with India rubber trees whereas in the Gutta percha producing regions the trees are felled It is probable that a much larger yield would have been obtained had the Straits method been followed This is not however mentioned by way of recommending the destructive system of felling the trees but only to prevent unfavourable comparisons being drawn as to the yield

394**D 394**

A domestic febrifuge—Dichroa, (G Watt)

DICHROSTACHYS cinerea

It does not appear how often the trees were tapped in other words whether they yielded all that it was possible for them to do. At the same time the above experiment is instructive each tree having on an average yielded a little over 2 seers of milk one third of which consisted of Gutta percha. The average yield of true Gutta percha from the felled trees has been variously stated but it may be said to vary from 2 4 to 7 lb per tree the maximum recorded yield being 25 lb according to some writers 50 according to others and even 100 is given by one author. This seems highly improbable. (See the remarks p 106 regarding mistakes of yield arising from the milk being spoken of in some reports in others the fresh rubber in a third the dried rubber.)

Food—The FLOWERS are said to be eaten

Structure of the Wood—Red hard much valued in Cachar and Chit tagong. Mann says it does not float but he is probably referring to green wood. Major Lewin remarks that it is used in Chittagong for making beds tools &c and is sawn into boards for the Calcutta market. For further information regarding Gutta percha see INDIA RUBBER.

DICHROA, Lour Gen Pl Vol I 641

[GACEÆ

Dichroa febrifuga, Lour Fl Br Ind Vol II 406; SAXIFRA

Syn—ADAMIA CYANEA Wall (t 213) A VERSICOLOR Fortune

Vern—Basak HIND Basak dansuk (Gamble) aseru (Gimlette)

NEPAL Gebokanak LEPCHA Singnamuk BHUTIA

In an interesting report on the Economic Products of Nepal Dr Gimlette gives the above so-called Nepalese names (as in Gamble) as the Hindi names for this plant and Aseru as the Nepalese.

References—Yongt Hort Sub Cal 267 Gamble Man Timb 172 Cat Trees Shrubs and Climbers of Darjeeling 38

Habitat—An evergreen shrub common in the forests of the Eastern Himálaya (5 000 to 8 000 feet) from Nepal to Bhutan and in the Khásia Hills above 4 000 feet.

Medicine—The SHOOTS and the BARK of the roots are made into a decoction and used as a febrifuge by the Nepálese (Gamble). Dr Gimlette says this drug is given in doses of five mashas.

Structure of the Wood—White moderately hard with small pores and moderately broad to very fine medullary rays.

Domestic Uses—Employed by the Bhutias and Lepchas to burn at religious ceremonies.

Milky Saps

FOOD
Flowers.
395
TIMBER
396

397

MEDICINE
Shoots
398
Bark
399
TIMBER
400
DOMESTIC
401

DICHROSTACHYS, DC Gen Pl I 592

Dichrostachys cinerea, W & A Wight Ic t 357 Fl Br [Ind II 288 LEGUMINOSÆ

Syn—MIMOSA CINEREA Linn Roxb DESMANTHUS CINEREUS Willd ACACIA CINEREA Spreng A DALEA Desv

Vern—Vustuli HIND Kunlai kunrat kheri MHAIRWARA Kunlai kanlai MERWARA Kheri AJMERE Khen Raj Segum kati MAR & GOND Vadataalla vadatara (vedittalung kolindu in Ainslie) TAM Ve'uru (velituru konalu) yeltu (venuturu veluturu nela jamm) vanuturu according to Elliot) TEL Andara SING Viravriksha (according to Ainslie) SANS

References—Roxb Fl Ind Ed CBC 422 Brandis For Fl 171; Beddome Fl Sylva t clxxxv Gamble Man Timb 148 Thwaites Fl Ceylon Pl 99 Dalz & Gibs Bomb Fl 84; Aitchison Cat Pb and Sind Pl 53 Sir W Elliot Fl Andh 40 131 190 91 W & A Prod (864) p 278 Ainslie Mat Ind, II 458 Drury U Pl 181

402

D 402

DICLIPTERA
Roxburghiana**Dichrostachys**

Royle III Him Bot 182 Liotard Dyes 33 Watson's Report 18
Balfour Cyclop 946 Raj Gaz 29 Indian Forester Vols III 202
IV 232 VIII 30 XI 466 XII 33; App 2 Gasetteer N W
P (Bundelkhand) Vol I 80 (Agra) Vol IV LXXI

Habitat—A thorny shrub or small tree of the dry stony hills of the N W Provinces Western and Central India Rajputana Madras Ceylon &c Distributed to the Malay Islands Northern Australia Doubtfully distinct from *D nutans* a native of Tropical Africa

Gum—It is said to yield a gum but of this nothing is known

Dye—The lac insect is often found on the tree

Fibre—Mr J W Cherry of Salem Madras sent to the Calcutta International Exhibition a sample of a yellowish white good bast fibre which was said to have been obtained from this plant

Medicine—The young shoots are bruised and applied to the eyes in cases of ophthalmia

Fodder—The leaves are mixed with corn and given to riding horses (Ainslie) It is supposed to free them from both bots and worms

Structure of the Wood—Heartwood red extremely hard weight 70 to 80lb a cubic foot Used for walking sticks It is however too small to be of much use but is much valued for tent pegs

DICLIPTERA, Juss Gen Pl II, 1120

Several species of this genus are alluded to in the Gazetteers and other descriptive works on India Some are cultivated in gardens while others are referred to as wild (See Agra Gasetteer p lxxvi Sir W Elliott's Flora Andhrica pp 38 and 183 for *D parvibracteata* the *Ch ku velaga* of Telugu Stewart's Account of Hasara where *D Roxburghiana* is said to be one of the more remarkable of the herbaceous plants (also Bundelkhand Gasetteer p 83 &c &c)

[THACEÆ

409

Dicliptera Roxburghiana, Nees Fl Br Ind IV 553 ACAN

Vern—*kirsch sonni* *likshmana* (bazar name) PB Bouna SIMLA

References—Roxb Fl Ind Ed CBC 42 Voigt Hort Sub Cal 492 Dals & Gibs Bomb Fl 196 Aitchison Cat Pb and Sind Pl 113 Atkinson Him Dist 373 Balfour Cyclop 946

Habitat—According to the *Flora of British India* there are two forms of this plant—the one met with on the plains of India the other on the hills Regarding the former there seems little doubt but with the latter it is quite otherwise It is the hill plant alone which requires to be dealt with in this work and this fact has necessitated the writer's examining the specimens in his private herbarium with as much care as the time at his disposal would admit of A sample of the plant collected at Simla was by him sent to the authorities of the Royal Herbarium Kew the result being that it was pronounced *Dicliptera Roxburghiana* Nees var? Presumably it may be the plant described in the *Flora of British India* as var *bupleuroides* (sp Nees in Wall Pl As Rar III p 111) The writer would be more disposed however to place the Simla plant in another genus than to amalgamate it with *D Roxburghiana* The following are the chief characteristics of the two plants as recognised by the writer —

410

a D Roxburghiana Nees

Syn—This is apparently not the *Justicia chinensis* Linn as described by Roxburgh since that plant is said to have among other distinctive characters cordate leaves

A tropical species specimens of which in the writer's herbarium are in flower and dated February to May Leaves with a short petiole ($\frac{1}{4}$ to $\frac{1}{2}$ inch) nearly glabrous.

D 410

Dicoma—A strong bitter Febrifuge

(G Watt)

DIDYMOCARPUS
aromatica

Flower clusters sessile bracts obovate apiculate *tricostate* Fruit long flattened in the plane of the septum on dehiscence severing into two valves each with a portion of the ruptured septum down the middle which is seen to support the seeds

β *D. bupleuroides* Nees (the Simla plant)

A warm temperate plant ascending the hills to 6 000 feet in altitude and flowering in August to October Leaves with the petiole 1 to 1½ inches long all parts very hairy or hirsute Flower clusters pedunculate bracts lanceolate acuminate the inner ones awl shaped Fruit not half the length of that of the above flattened at right angles to the plane of the septum on dehiscence the septum separates from the valves and rising up ejects the seeds as in *Rungia*

Medicine—The drug sold in Upper India under the name of *laksmana* is the form β It is said to be a useful tonic

411

MEDICINE
412

DICOMA, Cass Gen Pl II 492

Dicoma tomentosa, Cass Fl Br Ind III 387 COMPOSITÆ

Vern—*Navananyi cha palu* BELGAUM

References—*Dalziel & Gibbs Bomb Fl 182 Atchison Cat Pl and Sind Pl 81 Koyle Ill Him Bot 248 Indian Forester XII app 15*

Habitat—An herb or low shrub with the branches clothed with white cottony wool It is met with in North West India the Western Peninsula and Sind to Ava

Medicine—Dr Peters of the Bombay Medical Service has kindly favoured the writer with a note on the medicinal uses of this plant It is he writes an agreeable strong bitter used in Belgaum as a febrifuge especially in the febrile attacks to which women are subject after child birth

413

MEDICINE
414

DICTAMNUS, Linn Gen Pl I 287

Dictamnus albus, Linn Fl Br Ind I 487 RUTACEÆ

Syn—*D. FRAXINELLA* Per D HIMALAYANUS Royle Ill 156 t 29

References—*U S Dispens 15th Ed 1634 Royle Ill Him Bot 156 t 29*

Habitat—A strong smelling shrubby plant met with on the temperate Western Himalaya from Kashmir to Kunawar (6 000 to 8 000 feet) very common in Pangi

Medicine—Indian writers do not appear to have paid much attention to this plant The bark of the root was once upon a time a favourite aromatic bitter Storck prescribed it for most nervous diseases also for intermittent fever amenorrhœa hysteria &c The writer has repeatedly been told by the hill people that the plant was used medicinally but could never discover for what purpose

415

MEDICINE
416

DIDYMOCARPUS, Wall Gen Pl II 1021

[GESNERACEÆ]

Didymocarpus aromatica, Wall Fl Br Ind IV 347

Vern—*Kumkuma* HIND *Kumkuma ranigowndhi* NEPAL

References—*Thwaites En Ceylon Pl 207 O Shughnessy Beng Dispens 478 Atkinson Him Dist 368 Royle Ill Him Bot 294*

Habitat—A succulent herbaceous plant met with in Nepal and Kumaon

Perfumery—The whole plant is said to be used as a perfume No subsequent author has alluded to this fact since Wallich first made it known and it may therefore be added as a caution against possible errors that the word *Kum kuma* is the Sanskrit for saffron (*Crocus sativa*)

417

PERFUMERY
418

D 418

DILLENIA
aurea.**Dillenia.****MEDICINE**
419

Medicine—Wallich wrote that it was used in Nepál as an aromatic medicine but Dr Gimlette who furnished the writer with a most interesting collection of the Nepál medicinal plants was apparently unacquainted with this drug from which circumstance it may at least be assumed to be unimportant

DIGERA, Forsk Gen Pl III 28**420****Digera arvensis, Forsk Fl Br Ind IV 717 Wight**[*Id.* t 732; **AMARANTACEÆ**]**Syn**—**D MURICATA Mart**

Vern—*Luta mahawria gungatiya* BENG *Kari gandhari* SANTAL
Das BIJNOR Tartara tandala lesma PB *Tandala* SIND *Getan*
BOMB *Chenchali kura chanchali kura* TEL

References—*Roxb Fl Ind Fd C B C* 226 *Voigt Hort Sub Cal*
114 *Thwaites En Ceylon Pl* 249 *Dale & Gibs Bomb Fl* 218
Stewart Pb Pl 182 *Aitchison Cat Pb and Sind Pl* 129 *Flora*
Andhrica by Sir Walter Elliot 34 36 *Dymock Mat Med W Ind 2nd*
Ed 889 *Murray Pl and Drugs Sind* 102 *Lisboa U Pl B mb*
361 *Atkinson N W P Econ Prod Pt Foods* 91 97 *Indian Forester*
XII App 20

Habitat—A small annual herb of the plains of Bengal and North West India South Deccan Concan Mysore and the Carnatic to Peshawar and the Salt Range Distributed on the one side through Burma to Ceylon and on the other to Beluchistan Afghanistan Arabia and Africa

Food—It serves as a pot herb Leaves and tender tops are also used by the natives in their curries

FOOD**421****FODDER****422****423**

Fodder—Used as fodder in South Baluchistan

Digitaria—A genus of grasses the species of which have been reduced to *Panicum* Linn Several species are alluded to as met with in the Banda District and *D sanguinale* (*Panicum sanguinale* Linn) is specially alluded by Stewart in his account of Hazara

Dikamali (or Decamali) Resin see *Gardenia lucida, Roxb*

Dilivaria ilicifolia, Nees see *Acanthus ilicifolia, Linn ACANTHACEÆ*

[*Vol I A No* 324]

Dill, see *Peucedanum graveolens, Benth UMBELLIFERÆ*

DILLENIA, Linn Gen Pl, I 13**424****Dillenia aurea, Smith Fl Br Ind, I, 37 DILLENiaceÆ**[*OBOVATA Blume***Syn**—**D ORNATA Wall D SPECIOSA Griff Notul IV 703 COLBERTIA**

Vern—*Dheugr NEPAL Chamaggar N W P; Bynben (sen dwon*
according to Mason) BURM

References—*Brandis For Fl 2 Kurr For Fl Burma I* 20
Gamble Man Timb 3 Mason Burma and Its People 408 532 741

Habitat—A large tree of Nepál Bhután Bengal Burma and the Andaman Islands distributed to Java Borneo &c Mason speaks of this tree at Maulmain as being highly ornamental The visitor in February he says has his attention arrested by a tree without leaf but covered with large gaudy yellow flowers

Structure of the Wood—Grey beautifully mottled, hard, close-grained weight from 45 to 49lb a cubic foot

TIMBER**425****426****D bracteata, Wight Ic t 358 Fl Br Ind I 37**

Syn—**D REPANDA Roxb Fl Ind, Ed C B C 452 WORMIA BRAC**
TEATA Beddome t 115

D 426

Dillenia, the Chalta.	(G Watt)	DILLENIA parviflora
Habitat —A handsome tree of the Western Peninsula, especially at Mysore and Coimbatore.		USES 427
Properties and Uses. —Practically the same as those recorded under the other species		
Dillenia indica, Linn Fl Br Ind I 36		428
Syn — <i>D. SPECIOSA</i> and <i>ELLIPTICA</i> Thunb <i>Beddome t 103.</i>		
Vern — <i>Chálta</i> HIND <i>Cháltá hargesa</i> BENG <i>Korkot</i> SANTAL <i>Chilta</i> MONGHYR <i>Panpu</i> , GARO <i>Chalita otengah</i> ASSAM <i>Ras, oao</i> URIYA <i>Ramphal</i> NEPAL <i>Phamskol</i> LEPCHA; <i>Thapru chauralesi</i> MAGH <i>Mothe karamala mota karmel karambel</i> BOMB <i>Mota kar mal karmbel</i> MAR <i>Uva TAM Uva perda kalinga (kalinga</i> Elliot) TEL <i>Bettakanagala, kadkanagula</i> KAN <i>Syalista</i> MALAY <i>Thabyu</i> , BURM <i>Carllow</i> TALEING <i>Hondapara</i> SING <i>Bhavya</i> (according to Dutt) <i>ruuya</i> (Birdwood) SANS		
References — <i>Roxb Fl Ind Ed C B C 451, Brandis For Fl 1 Kura For Fl Burm I 19 Gamble Man Timb 2 Dala & Gibs Bomb Fl 2 Elliot Fl Andh pp 79 187 148 Rev A Campbell Econ Prod of Chutia Nagpur No 8782, Mason Burma and Its People pp 532 740 U C Dutt Mat Med Hind 294 Dymock Mat Med W Ind 2nd Ed 890 Lisboa U Pl Bomb 1 143 Atkinson Econ Prod Pt V 43 Smith Dic 154, Jour Agri Hort Soc 1885 Vol VII Pt III New Series 276 Vol XIII 345 Gazetteer of Orissa II 179 App VI; Mysore and Coorg I 57 N W P IV lxvii X 716; Indian Forester I 86 V 214 497 VI 240 VIII 415 438 X 33 XI 230 XIV 297 Official Note on the Condition of the People of Assam</i>		
Habitat —A large evergreen tree of Bengal Central and South India and Burma often planted Distributed through the Eastern Peninsula from Sylhet to Singapore Rare on the plains of Northern or Western India but occurs along the base of the hills from Kumáon and Garhwál eastward and becomes plentiful from South Kanara southwards		
Fibre —In the Hazaribagh District the <i>Tasar</i> silk worm is said to feed on this plant and in an article on the trees of Cachar (<i>Agri Hort Soc Jour XIII p 345</i>) the <i>Atlas</i> silk worm is also said to feed on these leaves		Silk worm. 429
Medicine. —The JUICE of the fruit mixed with sugar and water is used as a cooling beverage in fevers and as a cough mixture The BARK and the LEAVES are astringent and are used medicinally The FRUIT is slightly laxative but is apt to induce diarrhoea if too freely indulged in (<i>Roxburgh Royle Drury &c</i>)		MEDICINE Juice 430 Bark 431 Leaves 432
Food —The fruit is large about 3 inches in diameter and is surrounded by fleshy accrescent calyces which when the fruit is full grown (in February) have an agreeably acid taste and are eaten by the natives either raw or cooked—chiefly cooked in curries They are also made into a pleasant jelly The acid juice sweetened with sugar forms a cooling drink		Fruit 433 FOOD 434
Structure of the Wood —Red with white specks close-grained moderately hard It is used to make helves and gunstocks and in construction and is said to be durable under water It makes good fire-wood and charcoal Weight 40 to 45 lb a cubic foot		TIMBER 435
D parviflora, Griff Fl Br Ind I, 38		436
Vern — <i>Lingyau</i> BURM		
Habitat. —A tall deciduous tree met with in the forests of Tenasserim Mergui Pegu and the Andaman Islands		
Properties and Uses. —Same as those recorded under the other species		USES 437
1	D 437	

to admit of Two First (H) Principles and in what Sense it cannot be said that according to the *Manichees*, God is the Author (I) of Sin I shall also criticize a Modern

Ipsi sint dexteri & *utrique iterum Levi* Tho this Passage of *Amobius* favours the *Manichees* it contains a Remark which puzzles them and overthrows all their Worship for the Reason why they admitted of an Ill Principle was that they believed that Principle could do no Harm They believed therefore that the other Principle could do no Good and so all their divine Worship was needless the gracious God had never punished them for their Iniquity and they could never expect that the malicious God should be propitious to them As it carries on that Objection against the Heathens with great force but they might have answered him that the most cruel Tyrants make a very great Distinction between those who honour them and those who despise them and that the mildest Kings make the same Distinction between those who resist them and those who offend them and that proportionably the same Judgment ought to be made of good and mischievous Deities I think that such a Reply cannot be made use of against the System of Zoroaster or that of the *Manichees* by a Man who reasons closely

(H) The Other & second admit of two First Principles It has been a constant Opinion amongst Christians from the Beginning that the Devil is the Author of all false Religions that he moves the Heretics to dogmatize and inspires Men with Errors Superstitions Schisms Lewdness Avarice Intemperance in a word with all the Crimes that are committed amongst Men That he deprived Adam and Eve of their Innocency from whence it follows that he is the Cause of Moral Evil and of all the Misery of Mankind He is therefore the first Principle of Evil But I say he is not Eternal nor uncreated He is not the first Ill Principle in the Sense of the *Manichees* which afforded those Heretics I know not what matter of boasting and Insulting or the Orthodox They might have told them Your Doctrines much more prejudicial to the Good God than ours for you make him the Cause of the Ill Principle you assert that he produced him and that tho he could stop him at the first Step he made yet he permitted him to usurp to great a Power in this World that Mankind having been divided into two Cities (f) that of God and that of the Devil the first was always very small and even so small for many Ages that it had not two Inhabitants when the other had two Millions We are not obliged to enquire into the Cause of the Wickedness of our Ill Principle for when an uncreated Being is so or so one cannot say why it is so it is its Nature, one must necessarily stop there but as for the Qualities of a Creature one ought to inquire into the Reason of them and it cannot be found but in its Cause You must therefore say that God is the Author of the Devils Malice that he himself produced it such as it is or loved the Seeds of it in the Soil that he created which is a thousand times more dishonourable to God than to say that he is not the only necessary and independent Being This brings in again the above mentioned Objections concerning the Fall of the first Man it is not therefore necessary to insist any longer upon it We must humbly acknowledge that Philosophy here are at a stand and that its Weakness ought to lead us to the Light of Revelation where we shall find a sure and steadfast Anchor Note that those Heretics made in ill use of some Passages of the holy Scriptures wherein the Devil is called the (g) Prince and the (h) God of this World

(I) That according to the *Manichees* God is the Author of Sin The Style of the Orthodox does not avail us in this Point To be a *Manichee* and to make God the Author of Sin are two Expressions which always signified the same thing amongst Orthodox Christians and when a Christian Sect accuses another of making God the Author of Sin it never fails to impute *Manicheism* to it in that respect It is a just Accusation in one Sense seeing it is true that the *Manichees* acknowledged that an Eternal Being was the Cause of Sin But if you consider the thing another way you will find another Sense according to which they may say they don't make God to be the Author of Sin for they may maintain that neither the Good Principle deserves the Name of God and that for great and to glorious

a Name ought never to be bestowed upon the Ill Principle and consequently that their *Hypotheses* is the most favourable to God All other *Hypotheses* involve him in Sin as the above mentioned I must acknowledge it I would it be supposed (say he)

That God did create a Man of all the Events of Eternity and was willing that all the Evils Disorders and Crimes which prevail in the World should come into it thus I enough It will be impossible to persuade any one that so many Crimes should be put by Chance into the Project of God's Providence And if they came into it by the Disposition of the most profound Wisdom of God whether that Disposition be called Permissum or Will the Minds of rash Men will never be satisfied and it will never be clearly shewn that this agrees with the Hatred God expresses other wise for Sin It will not be in any ones Power to hinder the Libertines from accusing Christianity of making God the Author of Sin for the common Sense of all Men leads them to believe that he who could prevent the Fall of the first Man as easily as he permitted it and who opened all the Ways wherein Men have wandered when he might easily have shut them may be looked upon as the Author of the Evil which he should have prevented according to his Principles and his hatred for Evil Afterwards he answers an Objection grounded upon the *Scriptura medica* This does not at all lessen the Difficulty I say he may say that since God foretold that Adam being placed in such Circumstances would undo himself and an infinity of Millions of Men by his free Will and yet he placed him in those said Circumstances it is plain that he is the first Author of all Evils If a Sovereign knew certainly that if he should place a Man in a Crowd with a Sword in his hand it would raise a Sedition and occasion a Fight in which ten thousand Men should be killed he might very well according to the rigour of the Law be look'd upon as the first Author of all those Murders It would be to no purpose for him to say I order'd not that Man to strike any Body with his Sword nor to raise a Sedition on the contrary I forbade him to do it I have not moved his Arm to kill nor form'd his Voice to excite the People to fight He would be answered you knew certainly that that Man being placed in such Circumstances would be the Cause of those Miseries It was in your Power to place him in more favourable Circumstances which might have produced all manner of Happiness I am sure he could reply nothing that could put a stop to the murmuring of the People and if we will speak sin rely we must confess that nothing can be answered for God that can silence the Minds of Men

(J) Lastly the very God of *Sacraments* may be accused of being the Author of Sin (K) To conclude I maintain that there is no evil in Adam before the God of St. Augustine and the God of *Epicurus* who was altogether un concerned with the Affairs of Mankind or the God of Aristotle whose Care extended not lower than the Sphere of the Moon For as soon as you acknowledge a general Providence which embraces every thing the Difficulty springs up again and when you think you have shut a Door it comes in again thro another This Author does not mince the Matter But if the God of the *Manichees* I mean the God Principle who they call'd God by Excellency had presented him self to the Mind of that Manichee I fancy he would have express'd himself somewhat differently and confessed that their *Hypothesis* clears God for it accuses all Evil to the Ill Principle It will not be needful to know what he answers to his Censors

(L) There is also in this Traith (say Mr Jurieu) an Observation upon what I have said somewhere that whatever Method be made use of it is never be possible perfectly to relieve the Scruples which the Objections of prophane Men raise in one Mind concerning God Providence about Sin If those Gentlemen have found out the Way of clearing perfectly those Difficulties they will oblige us to acquaint us with it Perhaps it will be said you are in the wrong

(a) Jurieu Judge ment about rigid and mitigated Aeth 1

(b) 18 pag 7 (c) 16 pag 73

(d) Jurieu 2d Apol p 30 c 1 2 apud Saurin Exam nation of Mr Jurieu Theol pag 210

(f) See St. Augustin de Civitate Dei

(g) John XIV 30

(h) 2 Ep to the Corinth ch 4 v 4

PAULINA (Tolli) See the Remark of the Article LOILLIUS
 PEYRARDE (Tolli) a Gentleman of (C) of age and (A) a Protestant
 with a good Latin Poet and a good Critic. He began to be known at 17 as
 with the beginning of the reign of Louis XIV. He published the Remarks
 on *Loire* and some *Hemistichs*, which filled up the Impertinent Verles of the *ines*,
 to which he added some Verses. He dedicated that Work to the Queen of *Sweden*.
 His Corrections and critical Conjectures upon *Flo* s. deserved the Approbation
 of *L. Mouton* the *Printer*, who follow'd them often, and (A) made in honourable menti-
 on of him. *B* speaks of him some times in his Letters. I shall set down a Pal-
 lage out of them which is very (B) glorious to him. We find in it a letter, which he
 writ from *Paris* the 20th of April 1641 to *Il* ac *thus* that he began to feel the In-
 firmities of old Age and that for the Space of Thirty Years he had laboured under
 great Difficulties, or spent his Time in improving his Estate. It appears from
 that Letter that he had a Son

P. L. R. L. (James D. 1701) a Gentleman of (C) of age one of the most
 renowned Writers of the XVII. century tells us in the Preface before his Works
 that he was Son of *Peter d'Anzales*, and of *Mary* his wife of *Verneque*. He deserved not
 to be refuted by some learned Men, yet he had that Honour. He was ridiculed
 to some purpose in a Work of *M. de la Motte*, speaking of a Book which he intitled
anti B. u. He dyed of an Apoplexy * the 17th of May 1642. I have
 find something of him in the Article of *Balz*, and I shall give in Instance of
 the Narrowness (D) of his Genius

P. T. Y. R. E. R. L. (If. L. 17) born at *Boudoux*, made himself famous by his
 Criticisms

th. I. e. Constitutions the third to Peason
 and the fourth to be *lul*. The Protestants may
 more easily get out of this Perplexity by preterring
 the *lul* Authority to that of the Popes and Count-
 cils

(A) And a Trillist I e. w. a. r. y. r. alus
 Protestant as one may guess from a Letter Mr
 d. Balz to Mr. C. n. r. a. t. (B) T. who told, says
 he to him that *Th* r. th. l. e. n. r. s. It is a the
 Mr. Contrat n. M. de *Saint* n. M. Dille
 whom I have much affected to feel but it and wh. m.
 I prefer to *l. b.* or an *l. t. m.* initially. I f. i.
 ce. ve. that *Mont* cur. le. y. e. a. r. d. w. n. t. p. l. e. a. s. to make
 a Difference between *l. l.* and *l. n. e. t.* and *l. t. m.* in the
 free Conversation we had together, he put an *l. t. m.*
l. n. d. n. t. n. u. p. n. e. t. *l. m. b. l. l. o. k. without my*
D. l. n. Without *l. n. t. n. e. a. n. y. l. o. w. r. p. n. t.* I p. o. t. l.
 dear Sir that *l. b. r. e.* the *Huguenots* no more than you
 but the *Catholicks*

(A. d.) Int. m. l. in h. n. u. t. l. e. m. e. n. t. o. f. h. i. m.
 (e.) I follow the interpretation of the *Learn* d.
 M. n. i. P. e. n. a. l. e. t. i. s. l. e. in his Notes upon the
 9th Chapter of the *d. l. o. o. k.* He takes a n. i. l. e.
 I p. r. e. h. e. n. d. e. r. t. h. e. l. l. a. c. e. Th. e. W. o. r. d. s. s. a. y. e. (f.)
 I f. u. I have interpreted the *n. a. c. c. o. r. d.* to the
 Extirpation of the *illustrious* *Monseu* *Leysardelle*. The
 Abbot de *Miralle* quotes him often in his Remarks
 upon *S. t. r. i. c. t. u. s.*

(B.) A Passage which is very glorious to
 him. The loss of *Friday* last brought me some
 News of *M. n. i. c. h. a. d. P. y. a. r. d. e.* Do you know
 that his Name makes already a great Noise at
Paris as I think the *Celts* admire the *Aquitan*?
 Or if you had rather I should express my self
 another Way and speak poetically of a Poet
 the God of the *Scen* is surprised to hear the Muses
 of the *Dord* singing to well. For my Part I am
 charmed with their last Composition and if the
 Souls of the Blessed could be raised up by the
 Voice of *Gene* *Verles*, I don't doubt but that the
l. n. e. t. m. b. r. e. would come down from
 Heaven, at the very Moment that he should be
 told

T. nube serena
 Stellato fulge s'api & radiante coron
 Ad tua s'era vultu que multo Regia lusu
 Conceit ut faciat e'chori sanduque Senatus & c
 Aplice ut p'a geneus ingenti affixa seretro
 H' r' daque & c' l' r' is luget v' l' d' r' a pennis
 Que quondam tua castra tuu comitata trivemes
 Heipe i toties m' l' u' m' sanguine Pontum
 D' e' i' tua l' p' a' n' n' u' m' n' u' m' cadis acerbe
 I' i' t' r' i' n' e' t' u' m' l' p' i' s' q' u' e' m' a' l' i' g' n' i
 Imp'at' r' i' n' e' t' u' m' l' p' i' s' q' u' e' m' a' l' i' g' n' i

Did you ever see any thing more noble or more
 pathetic than that poor Victory afflicted with the
 Death of that brave Duke? What a Spectacle
 to see her with her torn Clothes and broken
 Wings make Penance for a Fault which the

thought to be guilty of to see her fiftened and
 as it were nailed to that great Coffin which the
 wailies with her Tears? She cannot ease her
 Grief for the Misto time that happens at *Orbital*
l. b. She would fain impute it to a bad Destiny.
 She & c. (C) Mr. d. l. e. t. e. write this the 4th
 of December 1640

(C) To be refuted by some *Learn* d. M. His last
 l. l. of the *P. r. i. m. a. n. t. l. e. o. f. M. l. b. i. e. d. e.* printed in
 the Year 1622 was refuted by *S. l. i. a. n. a. J. u. s. t.*
 His Job printed the next Year was refuted by *Bol-
 du* a *l. p. u. b. l. i. c.* and by *P. r. i. v. a. t. u. s.* He should have
 thanked that *J. e. i. r.* instead of being so imprudent
 as to write against him a Chronological Book intitled
 the *D. i. s. c. i. p. l. i. n. e.* Time. As he that I mention d. with
 out being named in the Preface of the *d. l. a. i. r.* of
 the *R. a. t. i. o. n. a. l. i. u. m. t. e. m. p. o. r. u. m.* wherein he said that
 all Chronological Books that were come out till
 then were none was more wretched than that which was
 intitled *H. y. l. c. h. r. o. n. l. o. g. y.* La *l. e. v. r. e.* is the *A. u. t. h. o. r.*
 l. i. c. and I shall tell printed in 16 and 17
 intitled *H. y. l. c. e. o. g. r. a. p. h. y.* n. e. *I. d. i. s. t. i. p. t. i. l. l. e.*
 Earth and a *l. i. c. e. D. e. m. o. n. s. t. r. a. t. i. o. n. e. o. f. t. h. e. T. r. i. s. t. i. l. l. i. t. y.*
 I wonder that *Vossius* placed not that Au-
 thor in his great Catalogue of Chronol. g.

(D.) An English of the *Narrowness* of his (C) n. u. s.
 I find it in the Abbot de *Maillois*. Mr. le *Libre*
 l. n. t. e. u. (y. s. b.) mentions that the com-
 m. n. Way of reckoning 11 Years of (C) r. d. is
 is the best and on hit to preferred to all
 others against the Opinion of *S. l. i. g. e. r.* I rather
 prefer to and others who r. k. n. 11 m. few Years
 more or cut off some and then I saw that he
 praised upon that Account the lat. Mr. de *la*
P. e. r. y. James d. *Angoles* whom I knew all very
 well. I did a little wonder at it because the good
 Man had no great Genius for it though he ap-
 plied himself very much to it which I easily
 perceived because he was of Opinion that the
 Year might be made up of three hundred and
 sixty four Days instead of three hundred and
 sixty five and some what more that it might all
 ways begin of a Sunday and end with a Saturday.
 Certainly he understood not very well that Sic-
 ence for if his Opinion was followed *Janua* r.
 would soon be found in the Season of *August* be-
 cause the Years would always be too short by one
 Day and some Hours which being lost upon the
 Month they must necessarily go forward. But
 he never could understand it and fell into a pre-
 s. l. a. s. s. i. o. n. about it from whence I inferred that
 Mr. de *la* *P. e. r. y.* was not so great a Man as he
 thought himself to be in the Science which he pro-
 fess'd. He observed sometimes in his Disputes what he
 practised by those that are at Law for he declared
 where he made his Abode. (b) He dated his *Acti*
Raban at *Paris* in the House of Mr. *Cottouri* a Man
 of *Probity* and *Honour* wherein he lived the 5th
 of *August* 1631. Is not this a Sign of a weak
 Man?

† He call d.
 b. m. l. f. no
 l. a. l. e. Aquie
 canus m.
 b. i. Works
 o. r. f. l. e. Ab
 b. o. t. de Ma
 rolles ob
 f. e. in
 f. l. e. L. l. f.
 the Antho
 who oblig
 ed him
 B. S. e. the
 Abbot de
 Maillois
 il

γ It is l. i.
 4 f.
 the the
 m. e. i.
 t. e. n. r. J.
 (C) d.
 Vossius
 l. i. b. t. u.
 e. t. m.
 M. n. e. r. i.
 D. i. l. o. n. y.
 t. h. i. b.
 Name was
 d. A. u. t. o. r.
 l. a. R. e. i. n. e.
 is not true
 J. Nobilis
 A. r. v. e. n. a.
 l. u. d. u. s.
 J. b.
 l. i. f. a.
 † In the
 d. Tome of
 th. An. t.
 † p. 236
 † I. S. u.
 Answer to
 A. l. i. t. y.
 f. i. b. r.
 l. o. l. u. c.
 l. u. l. o. r.
 J. i. b. b.
 l. i. t. i.
 p. 234
 l. i. d. 36
 p. m. l. d.
 b. n. o. n.
 j. u. r. n. t. o. m.
 p. 519
 j. e. y. t. h. a. t.
 b. y. d. f. a.
 m. i. l. l. i. n. k.
 i. r. t. h. e.
 s. o. f. j. u. r.

(C) E. i. z. a. c.
 c. l. o. e. l. e. t.
 P. a. t.
 B. o. k. 2.
 l. i. t. r. 37.
 p. m. 378.

(b) See
 Mr. Bail
 let's Anti
 tom 2 p.
 24 41

(a) Marol
 ni novis
 pag. 272

(b) Baillet
 ubi sup.
 pag. 242

† See the
Remark B

† See the
Remark C

(c) Note
that I have
seen in the
Catalogue
of a Lib. a
ry wh ch
was f d at
Leyden n
the first f
October
1695
that Book
concerning
the Pre
Adamites
printed
in 8vo
in 1653
and these
Words are
added
Editio op
tima

(d) Pet
ad Ando
animadu
ad vindi
at Diff
tations
pag 10
(e) M
Morin
(Morin the
Astrolo
ger) Anto
ny Hulfus
Author of
the Non
ens Pra
adamiti
cum 7
Pythius
of 7 Hil
perius
(f) It
wa prin
t d at
Stein
(g) Tho
Bangius in
calo Ori
entis exer
cit II
quæst 8
pag 134
apud Th
mam
Crenum
faice 2
exercita
tionum
philosop
hica um
pag
13

(b) Tho
Crenius ib

(i) Id ib
pag 8

(k) Id ib
pag 10

(l) Peter
de St. Ro
mund a
Chrono
logical and
Historical
Journal
25 Decem
p m 675

Treatise concerning the *Pre Adamites*, (A) which was printed in *Holland* in the Year 1655, and immediatly refused (A) by a Multitude of Authors He was then a Protestant, and had a Place in the House of the Prince of *Conde* Tho he published his Book without putting his Name to it, he was known to be the Author of it, hence it is that he was imprisoned in the *Spinnb* (B) *Neth lands* He found no better Way to come off, than to lay his Doctrine upon the Principles of the Protestants, and to promise to go to *Mals* He went to *Rome*, where he was kindly received by *Alex n r VII* He publish'd, as is usual, the Motives which induc'd him to change his Religion Some Catholics (B d) laugh'd at it He spent the last Years of his Life in a Retirement He had been in *Denm*, where he attended Mr de *le Thuill* Ambassador of *France*, and compos'd there (C) two Relations which have been printed He is mention'd (D) in the *Menagiana*, as you may see in the Remarks You will find some (E) very curious Circumstances in the Fragment of a Letter which I shall set down

P E I R L S C

(A) Concerning the *Pre Adamites* which was printed in *Holland* in the Year (c) 1655 [Mr *Heid nus* was accus'd of having had a Hand in the printing of that Book but he cleared himself of it and his Accuser never durst reply to it This what I find in *Pet us ib Ando* (d) *Ignorantiam Marci sequitur ejus off ne qd immitte me lacum quavis p x d g nissimum* Eum scilicet qui famulum ducit into ho diernos Cartesianos clittericatum fuisse editum libri de *Iradaam* tis inlucryti Sed cum vir ille doct / ius detelland um lunc calumniam publice / t amo l ius in i nte fonda sua um onferationum de Sabbath / dy die Dominica pag 31 Nec ille qui ut inquit Marcius olim per indirectum id exprobraverat cu jus gonibeam qd per fluvia bi lunc bene ac refobere vult n lte quicquam respondere potuerit maledi cti ssima l g i p cili m inter futa iey eremus nisi dudum in auct us apud recidit cum immortalis ejus ignominia You'll find in *Moie* is Supplement the Plan of the Book concerning the *Pre Adamites*

(A d) And immediatly refused by a Multitude of Author [The Author of *Morris* Supplement names only four (c) persons who wrote against the System of the *Pre Adamites* Here is a larger Catalogue *Joh Comid Dinnhaverus* Professor of Divinity at *Straburg* published there *Pradamitica nota sive fabula priorum hominum ante Adamum conditorum explosa* *Joh M exelius* Professor of Philo sophy and Rector of a College at *Stetin* published a Book (f) against *la Peyrere* *Joh Henry Ursinus* printed at *Bamford* *Novus Pronetius Pradamitarum plastes ad causam relegatus qd religatus* *Samuel Marefus* Professor of Divinity at *Groningen* printed there *Refutatio fabula Pradamitica absoluta septem pri bu quætionibus cum præfatione Apologetica p o v d i t i a sacre scriptura* *Joh Hilbertus* Professor at *Hilmslad* printed at *Amsterdam* *Disquisitione de i cadamitis* The *Nonens Pradamit cum* of *Antony Hulfus* was printed for *Joh Elzevir* at *Ley den* *Philip le Prieur* published at *Paris* *Animad versiones in librum Pradamitarum* He took the Name of *Eusebius Romanus* All those Books were printed in the Year 1656 as *Th mas Bangius* (g) observes who adds, that *La Peyrere* shew'd him his Manuscript at *Copenhagen* in 1645 and then he says *Neutiquam tamen persuadere nobis unquam potui ut e) tentemur dilapsum vitium illi humanum qd inge niosum ut hoc cum mentium publicum ius excedendum daret n lter p l a n o s t r u m expostul fuisset* Mr *Crenius* (h) observes that *Calenus* and *Schotanus* have warmly disputed against the *Pre Adamitic* Hypothesis the Former in the three Volumes of his common Places and the Latter in his *Bibliothèque* of the holy History He says also (i) That there are to be found in the Edition of the *Pronetius* *Pre adamitarum* of *Joh Henry Ursinus* doctissimorum quorundam Galorum in librum de *Pradamitis* note censorie and that *Philip le Prieur* (k) put out another Edition of his Work at *Paris* in the Year 1658 wherein he praises his Antagonist for having embrac'd the Church of *Rome* *Bangius* says nothing of a Treatise printed at *Leyden* in 1656 with this Title *Responsio ecclesiastica ad tractatum incerto autore nuper editum cum titulis Pradamitæ Autore 7 Py thio Ministo Jesu Christi in Swartwael*

(B) That he was imprisoned in the Spanish *Nether lands* [In the Year (l) 1655 The Bishop of *Namur* published a Censure of the Book concerning the *Pre Adamites* written by the *Sieur la Peyrere* but without naming him because he had not said that he was the Author of it tho it was but too well known But he was used

worse upon the same Account being at *Brussels* in *February* (m) 1655 Thirty Armed Men rush'd upon his Chamber and apprehended him and then having carried him through several long Windings of the Streets of *Brissl* they clapp'd him up at last in the Tower of *St Embe* g with the Content of the Arch Duke *Leopld* He was told that it was by the Authority of the great Vicar of the Archbishop of *Mecklen* At last after he had been some time in that Tower he came out of it by the Credit of the Prince of *Conde* his Master and immediately by his Advice he went to *Rome* and threw himself at the Pope's Feet and submitted himself and his Book to his Will and so he became a Catholic and had as good a Success as he could wish This what he himself says in his Letter to the most Holy Father *Pope Alexai VII* See the Remark F (B d) *Sone Catholics laugh'd at it* Read this Passage out of a Letter (f) (y) *Patin* writt in the 9th of April 1648 The Author of the Book concerning the *Pre Adamite* whose Name is *Isaac de la (n) Peter* is a *Gascon* where being return'd from *Rome* He has published a little Book in Quarto in which he gives an Account of the Reasons which mov'd him to change his Religion, (which in School Terms is call'd to abuse one's Heresy) and he shew's his Book concerning the *Pre Adamites* I have seen the Book it does not sell well This said that the Pope has given him a small Allowance and that *Morin* has promised him some new favour for this favour as gr edily as you may want of a (c) who is a raid of starving and who hath changed his Religion only to raise himself and fare better at any Bodys Cost He shew's himself here as it he was a great Worker of Miracles or a Publisher of lardons (o) *A Gascon* who is a learn'd Man a Courtier and a converted *Hu* uenot lately come from *Rome* is very fit to act such a Comedy

(C) Two Relations which have been printed [He made em for *la Mothe lelayer* his friend one of them is a Relation of *Greenland* and the other of *T Island* they are both curious enough I have quoted something of the Latter in the Article *Joni* (Ain grimus) He dedicated it to the Prince of *Conde* and he intimates in the Preface Dedication that he designs to write the Life of that Hero I think he is the Author of the Relation of the *Battel of Lens*

(D) He is mention'd in the *Menagiana* (p) *Isaac de la Peyrere* of *Bordeaux* is the Author of a Book intitled *The Pre Adamites* wherein he pretends to shew that *Adam* is not the First Man The good Man boarded at *Nostre Dame des lertus* in the House of the Fathers of the Oratory He was still infatuated with his *Pre Adamites* and his likely he dyed with that fanatical Notion He would have been very well pleased had he known that there is a Rabbi who mentions *Adam's* Tutor But that Rabbi was a Rabbi n that is to say an Author not to be mislead When the Book concerning the *Pre Adamites* came out it was condemn'd to be burnt by the Hangman I defied the Author who was my friend to send it me before it came to Light He understood the Jest and sent me a Copy of it with this Verse of *David* changing the Word *Ursem* into that of *Igem*

Parce nec invidio sine me liber ibis in ignem (b) See the *Miscellaneous* (†) of *big Marville* 144 I tom (E) You will find some Circumstances in the Fragment of a Letter [I don't trust much *Peter de St Romald*

(m) I lo
icet is
therefore
mistaken
when he
says that
la Peyrere
retracted
his Opinion
in a Book
printed at
Rome in
the Year
1655 His
Pronetius
have
in 1655

(n) He
is said
have said
la Peyrere
is

(o) *Patin*
Lett 117
pag 454
455 of the
1 Tom

(p) *Isaac de la Peyrere*
Morin
should not
have nam'd
him
la Peyrere

(q) Com
minat
of the *Me
nagiana*
p 38 of
the Dutch
Edit

(†) He is
named
there de la
Peyrere.

so much proceed from want of knowledge, as from (E) Prejudices. It would be an unjust thing to impute to the Protestants what was reported, That Mr. *Leche* refused

or with a superficial Examination, perfwades to
Salvation Every Orthodox ought to try *Gritia*
Deism quod Am I am what I am by the Grace of
God I am Orthodox by Gt C *I nei f myself i*
the Gift of God nt by my Work by Inquiries and
Difficulties *nt by Wnsfll th ghly* Let the Exa-
mination be easy, or at least possibl let it be diffi-
cult or even impossible this is most certain than
(K) *A te* *read* no Body makes use of it Most Men cann o
read most of tho who can read do not reid
the Works of their Adverlaries they know the
Reasons of the contrary *Ty ty v* by some Frag-
ments which they had i the Arguments of their owne
Authors The Pretensions of the contrary Party are
but imperfectly and very weakly r presented in
these Fragments To know the Force of Objections,
they ought to be considered as they are placed
in th System and connected with the general
Principles intended for the Audience They are
therefore examining the Opinions of an Adversary
not merely to contrit the Answer of our Authors
with the Objections alke pced by them this is to
judge of the Force of a Wheel only by the Hfe s
ry may produce being separated from its Engine
so h a Thing cannot be call'd an Examination but

contrary Party. Here is the Effect of those Pass in
They read the Manifestos and Relations of the Enem-
ies as so many Fables, tho' their Reasons be
reprobable, they reject them and mind only
what can be answered. But whilst they are atten-
tive to the spurious Appearance of the Awar
without minding the Foundation of the Objection
they never acquire any Knowledge but what flatters
their Prejudices. If there be any ill News, they
don't believe them, they invent a thousand Reasons
to show that they are false, the malice in their style
betrays them. If there be any good News, their Credu-
lity has found (C) the weakest Appearances
as good as those as the futility, proof they use
their utmost Endeavours to discover the falsity of those
Appearances, they remove from their Fancy the
contrary Appearances, and so they spend the Year
in great Trouble and Unhappiness, thanks to their In-
fancy which removes the unpleasant Objects and
creates every Day some agreeable Phantasms
in their Fancy. Nothing but in order to be Freed
can deceive them, and it they will seriously ex-
amine themselves, they must needs confess that
they rest satisfied with such Reasons as they
should despise if they were all dged in favour
of their Enemies. It is certain that if the Rea-
sons pro and con in Matters of Religion are not
more carefully examined than those which concern
publick News, it does not deserve the Name of Ex-
amination. It is true also that the same Spirit
which commonly prevails in the New-Testants who
are zealous for a Party, prevails also in ungodly Men zealous
for their Religion. The Loss of a Battle affords
No grief but he is extremely pleased in the prospect of a
Victory, and therefore he is usually full of strength
by his Mind to overcome him. If that the Battle was
won, and if the Troops of the contrary are not undim-
inished, therefore there is great Probability for the Victory,
against one or else Probabilities for the Loss of the
Battle, it is enough for him to believe that it is won
and he is not less pleased in a Dispute about Religion
when they believe that their Adversaries are worst-
ed, they would not be less afflicted if they thought
their Adversaries triumph. So that the Trouble
which Men endeavour to avoid on both Side, and
the Pleasure which they endeavour to procure to
themselves, hinder them from examining Things im-
partially and make them see a double Weight and a
double Measure.

This is what a Third Party may be at once affirming the Rite and denying the fact. Affirming that Men ought to follow the Way of Examination but that no Body follows it. However it be the Difference proves very great in the Event for whereas those that err would perhaps become Orthodox if they were not perfwaded that they are so already the Orthodox it may be preserve themselves from Heresy because they humbly believe that they are Orthodox.

(F) *As I now I read.* After which his bene-
said I need not make a long Common in up-
pon this Example I Men that are at Law and
of the Novelties which I have made use of is very apt
to make us apprehend that a Min who is a Judge
and a Lary cannot well discern Truth from
Falshood Men are not allowed to be Judges
in Laryes for two very good Reasons First Because
they would be apt to decide in their behalf tho
they should be s'nfible of their Injustice Secondly
Because they would be apt to believe that they are
in the Right e'en when the Iustice of the Cause of
the contrary Lary might easily be known Every
Body is a Judge and a Lary in Disputes about Re-
ligion for Men do not examine the Reasons of their
Advantages with a sceptical and Pyrrhonian Spirit
Such a Disposition would be look'd upon as a Crime
They examine them therefore being fully perswaded
that the Religion they profess is the only true
one Thus they are almost prepossessed with the
above mentioned falfions of the *Novelties* Three
Probables are on the side of our I re possession pre-
vail upon us twelve on the other side the Rea-
son of it is this Cause we are infinitely more atten-
tive to such Probables as are as please us than to those
which make us uneasy Mr *Nolle* confirms what
I say (d) *The Disposition there is between
God and his Creatures and between Eternal and Tem-*

(2) We
think the e
w in the e
for j no
vel it
they have
the A s f
affiling
them-
selves
They be
lieve what
they se
and n s
what they
wish

(d)Nicolle
Preface to
the well
grounded
Prejudices,
pag * 4
the Dutch
Edition

a 1 gust
 nt e
 Ep it tum
 dain

(b) See
the Philo-
sophical
Comment
on 1 p n
the Word
Compel
them to
come in
1 a 2 c b
1 p 548
of 104 of
1 1 4 1
21 7 9

RELECTIONS
upon the
Prejudices
of the
Africans

* He is the Author of an Anonymous Book intitled, Various Problems printed at Paris in the Year 1647 in 1 See the Anti-quit of Culture by letter Morel

(c) *Mal* Paving
confess d
during his
last Sick
nefs fight
zed his
friends
and there
fore his
Physicians
as used
him of fear
he said I
would
fatu com
municate
but since
I perceive
that my
friends
are to tur
pised at
my Con
fessi n I
am afraid
they
would be
none still
wherefore
I better
to put it
off and
the next
having
of the same
Q u i n s
he did not
communi
cate I s e
I u, 43
built this
sep inty
in January
of the
Dutch Ga
veltes gave
out this
Mr hoz
retary
of the l
set and
Mr Stoup
pc Lieu
tenant Ge
neral died
Body infe s
Rienccourt
s XIV pag
sacram is
about T e a
That A thor
D paucers
I d h e
of Delpan

bear them which say they a very false. They
 add That the *cr al* *g* pious Persons have put
 their Confession and Communion in their Sicknes
 either because they did not think to be so ill as
 they were or because the Concerns of their Family
 required not that they should be thought to be re-
 dy to die Such Delays wherein the Conscience
 is not concerned may be the Reason why a Man
 dies without Confession However a Catholick (*d*)
 historian will doubtless be alledged against *Pa*
 This history was printed at *Paris* with the
 King's Privilege in the Year 154 These Words
 are to be found int pag 22 in the 1st of the Tome (*)*
Pa l Pellu n Religion was virtuously spoken of
 some said that he had none that he was only
 a Time server and that according to him the
 Religion of the *Irish* and that which he
 his Ambition was always the best Others be-
 lieved that he was a Protestant in his Heart and
 others that he was a Catholic in earnest What
 is certain is that he prefl the two Religions
 in several parts of his Life and appear d zealous
 of both But as his dying words he profess none
 openly for he would not give the sacraments
 of the Church nor durst o use the last to
 be a *q*uent but he perfisted to the last in a
 profound silence the Reasons whereof are only
 known to God But they who know that this
 Words are not to be found in the *Paris* Edition will
 not produce that Witness I know that the *Dutch*
 Edition contains many Things which Mr *de Rieu*
court never thought of Note That the *Dutch* Edition
 contains in the Title these Words *1^{re} de la*
Clau de Barbin in the Prieste 1554 with the King's
License Will they who find this at forty Years
 hence in some Library be able to know that it
 is a fupposed one? Will they not seriously
 believe that whatever it contains was published at
Paris by a Corrector of Accounts? And if any
 one objects to them that his Edition does not
 mention that profound Silence that (*f*) Re-
 jection of the Sacraments &c and that they fill
 the publick History Will they not produce
 a Copy wherein a thousand Witnesses may read
PARIS *IOR CLAUDE BARBIN* &c Will they be at
 the Pains for the Verification of those Editions Not
 at all Every one will like in his own Prejudice
 and will say for himself that he knows that which
 he would like to know from what it may be
 new difficult it is for Men to avoid *Irre* in
 the midst of so many Clouds which are left behind
 over the Time to come Our Brede efforts to
 much Care to deceive us to do to deceive our
 Poverty And Men it is hold is to fallify the
 Works of an Author whilst he is live who can
 assure us that the Manuscripts of the other 12
 been respected? Who can assure us that no Do-
 ctors Letter come for defending the Trick of a
 falsifyer of Books?

(6) *May Multius Leionis* (7) (8) From the 11
 my of the 11 fflon came *Rami 11ellon* fult
 1 fident at *Chambery* *Peter Pelliflon* fecond
 1 fident in the fame place *Thomaf Pelliflon* Quir
 ter Mafter of the Troop of *Vendarme* of *Givde*
Maugnon Governour of *Chambery*, and high I
 roff of *Dauphine* (9) *John Pelliflon* the only Recor
 der of Civil and Criminal of the *Parlement* of *Da*
uphine liv'd fev'n Years ago which is fo fignifi
 cante a Place that it is now divided into a
 each whereof is worth eleven Thoufand Crowns
John Pelliflon of *Andrieux* Principal of the Col
 lege of *Tonnoen* who made an Epitome of the *La*
cin Grammar which *Defta tier* (b) m'aryed,
 and who was the firft that compofed the *La* u
 at *Paris* without receiving any Sacrament and no Body inf'd
 s from th'c that they renot g' Catholics (d) *Mr de Riencourt*,
 Correflor of *Acconts* (e) *Riencourt* II flory of *Lewis XIV* pag
 223 2 4 (f) for he VOULD NOT receive the Sacram't as
 of the Church *Comte Riencourt* *Ms Bp* (g) *Peter de*
lure of the *Chancery* *Antiquary* pag 23 (h) That a th
 of the *W* all h'w *Me* f'ls of *France* is called *D* *pauciers*,
 and not *Deftampier* *He* is fo fa from having enlarged the *W* of
 of *John P* *liffon* that the latter made an *Abridgement* of *Defta*
tie *End* *Ep* *Ms B* *l* *h* *of* *e*

(b) c
al re Lu

decline for them, but she eluded (C) their Amorous Addresses till the Return of her Husband, who destroyed them all. She is justly praised for relating to treat *Ulysses* as her Husband before she was sure (D) that he was *Ulysses*. Though her Virtue was sung by the greatest of all the Poets and by abundance of Writers yet it has been reflected upon. Some have said that if her Favors were disappointed,

tw 15

f) O id
i Epit
enelop
t Ulyss
m

f) Me
tic pag
β ws

l it it
bt r be
ad thur
d d bi
ian

ium Po
volum
Amphi
ndonta
que di
rum

f) Mezi
riac ubi
f

f) Ovi
t in Epit
in iolop
ad Ulyss
te

f) Mezi
riac ubi
f

f) Mezi
riac ubi
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f) Mezi
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Dulcibus [f] Samique ex quos tulit alta Zoen

Turba vincti non luxuriis per ci
Inque tua regnant nullis probentibus aula

Quid tibi Pajandum Iolybunque Medontaque [g]
d r m

Eurima bique avida Ant n que manus
Atque alias referam quos mncis turpiter abys

Ipsa duo partis sanguine bu als
Iris egens pecorisque Melanthi's auctor edendi

Ultimus accendit in tua damna pudor
[C] She lured the [unclear] Address [unclear] [h] Ho

mer in the d and 19th Books of the [unclear] says
that Penelope to free her self from the importu

nity of her Lovers, declared to them, that she
would not marry till she had finished a Piece of

Cloth which she was about to wrap up the Body
of Laert's her Father in law when he should die

and to the amuse them for the Space of three
Years and her Cloth was ne finished because

she undid in the Night what she had done in the
Day from whence comes the proverb the Cloth

of Penelope speaking of a Work which is ne c
ended This is Meziiri's Commentary upon these

Words of Ovid
Acc (i) mihi quarenti spati sum fallere nolam

L faret ut ti penduli telum in us
(D) Heo e fle was [unclear] that he was Ulysses] Me

rite having al dged a liffage which I have let
down in another Place (k) whereby it appears that

Hel na was deceived by the Resemblance the f and
between i m and her Husband adds the following

Words Full itius (l) up n the 2 d Book of the
Odyssee (lber ees that lenelope behaved her f li

much more prudently for though it seem d to
her that she knew Ulysses yet she would not ca

rels him in the least and he with him till he
told her many Particulars and gave her several

Tokens whereby she was assured that he was
truly her Husband and that she could not be

decei ed Penelope's Precaution ought to serve
for a Rule in all such Occasions and it a Woman

should commit Adultery for want of expecting a
full Information of the Truth she would be justly

blamed In what has been lately observed by Ma
Balanze in a fine Book which he has published

Let us suppose say he (m) a Woman who be
ing transported with Love for her true Husband

runs hastily to one whom she takes for him that
Woman does not design to deceive her self her

Aidom cannot be blamed it is lawful if it be
expressed to her true Husband In a Word her

Ignorance is involuntary and only the Effect
of a tender and passionate Eagernefs But it an

Adulterer has embraced that Woman can she be
excused? Will she not be somewhat ashamed of

her Ardour and Precipitancy? Will she not con
demn them? The Author who criticized Mr

Marmbo rg's very near of the same Opinion I add
that Restriction, because he thinks that if that Wo

man does not refuse to examine the Matter out of a
humane Morale she ought to be excused Here

are his Words, (a) I affirm That if a Woman
being deceived by the Resemblance which may

be between her true Husband and another Man
should grant to that other Man all the Privileges

of Marriage her Chastity would not suffer by it
Though this may look like a Paradox I say and

from her Mind every thing that might tempt her
to doubt of it I should very much abate of the

good Opinion I should have of her Merit and
truly I should not much blame her Husband for

doubting of her Chastity and looking upon her
Virtue as a wavering one (b) The nat

ural Resemblance which is to be found between
two Men is never so perfect but they differ in

something from whence it may be concluded
that a Woman who is deceived by it acts unwa

riely But in this very thing she wants not an
Excuse for are there any Women that scruple to

receive the Husbands after they have been ab
sent for some Months unless they prove first that

they are their Husbands? When they see them
come into their Chambers in the dark of the

Evening before the Candles are lighted don't
they go and meet em and are they not ready

to shew them all manner of Complaisance
without making any Enquiry? Does any Body

blame them for it? If they are not blamed for it
why should we blame an unfortunate Woman who

has been deceived by an Impostor who was in all
Respects as like her Husband as one may appear

to be in a dusky Room? It is plain that it is
blamed all Women who behave themselves in

that Manner towards their Husbands are all
to blame for according to right Reason w

ought not to judge of Things by the Faint and
before God two Actions which proceed from the

same Cause change not their Species though
the one succeeds accidentally and the other is

attended by accident with unlucky Consequences
To resolve this Difficulty we must say that any one

that behaves himself with Precipitation as to blame
whether any Evil results from it or not Whoever

will act reasonably ought to examine whatever he
does

I shall observe by the bye Seneca's Precaution He
affirms that a Man who knows his Wife being per

suaded that she is another Man's Wife commits
Adultery and that his Wife is innocent But he

does not say that a Man who should know another
Man's Wife thinking that she is his own Wife

would commit a Sin See the Word i Seneca (i) in
the Margin they pin e that Jacob did not commit

Adultery the first time he kni v Leah but that
Leah committed that Crime for she knew very well

that she was not Jacob's Wife
I return to Penelope They who remember a cer

tain Place of the Hexameron Rulique will perhaps
believe that her Precaution ought not to be much

admired because Ulysses made himself suspiciu
s by expressing too much eagerness to know her (d)

What makes me believe that Homer designed to mix
use of this noble Artifice is the impatience whi

he represents Ulysses in the 23 Book who was extre m
ly desirous to be with his Wife She had scarce spok

en time enough to know him and she had scarce spok

en time enough to know him and she had scarce spok

en time enough to know him and she had scarce spok

en time enough to know him and she had scarce spok

en time enough to know him and she had scarce spok

(c) d i
pa 285
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Infelic

lessy I have at last found out that the Hopes which *Gesnerus* gave of that Author have been taken for printed (C) Books I wonder that *Suvernus* and *Valenius Andreas* knew nothing of *Peraxylus* He was better known in Italy than in the Low Countries See how *Corradus* (D) praises him

P E R E I R A (*Gomefius*) a Spanish Physician who lived in the XVI Century He set up for a Spirit of Contradiction, for he affected to oppose the Doctrines that were best established, and to maintain Paradoxes The Liberty of Philosophizing was a great Charm to him; he made use of it, even to excess The *Materia prima* (A) which was so much talk of by the Sectors of *Aristotle*, was one of the Monsters he undertook to destroy What he substituted in the room of that Matter was not * better than what he rejected He used *Galen* very ill because of his Opinion about Agues But his most surprizing Paradox was, that Beasts are meer Machines, and have no Feeling All those Things may be seen in his Book intitled (B) *Antonia Margarita* This pretended by some, that *Cartesius* took from him

* See this Rem A

into *Praxylus*? IV What does he mean with his Diego Aulstao? Why did he not say *Aulstao*? I declare that I have nothing to say to him as to such things as may depend upon the Carelessness of the Correctors of the Press and that I have not seen his Version any where else but in Mr *Teiffier*'s Book

(C) The Hopes have been taken from printed Books I have consulted Father Labbe Dr Cave and Mr Du Pin in such Places where they give us a List of the Works of St *Chrysostom* they mention many Translators but never *Arnoldus Arlenius* I have not found him neither in the Authors who treat of several Editions and Translations of Dion W hereby I was almost convinced that *Arlenius* had never printed the Translations mentioned by Mr *Teiffier* I enquired into the Cause of that Mistake and found that it ought to be imputed altogether to the Abbreviators of *Gesnerus* They say positively that *Arlenius* translated some Moral Treatises from *Plutarch*'s Greek which had never been rendered into Latin that he translated also a Books of the Roman History of *Dion Cocceius*, the Commentaries of *Olympiodorus* (e) upon *Aristotle*'s Meteors and some Sermons and Treatises of *Chrysostom Theodor* &c When I go as far as *Gesnerus* I find that those Translations were only hoped for *Expeditamus* says he (f) ad *Arlenio nostro si Deus vitam extendit quosdam ex Plutarcho* &c They who abridged *Gesnerus* say that *Arlenius* translated those Books but they do not say that they were published They only say that he caused *Lycophron* with the Commentaries of *Tyrtius* to be printed at Basil in the Year 1545 and (g) then *Jesephus* in the same City with a Preface but without a Translation

(D) See how *Corradus* praises him He speaks of him thus (E) Ita quidem (postulatibus interpretationibus Epistolarum Ciceronis) ut *Arnoldus Arlenius* homo eruditissimus ex Germania ad me Regium usque venerit, ex me sua Joannis Operibus et Theatris, Magis Græci, aliorumque doctissimorum hominum animæ sit horatus eas ut primo quoque tempore foret datæ

(F) The *Materia prima* was one of the *Materia prima* Arriaga one of the most subtil School men of the XVII Century acquaints us with what was objected to our *Peraxyla* about that Subject and shews the Weakness of some of those Objections (I) Recentes nonnulli reserant quendam *Gomefium Peraxiam* in sua *Antonia Margarita* negantem omnino materiam primam contra quem plura congerant argumenta quæ oportet examinare ne rem certam incertis suadeamus sit omnibus (K) *Antonia Margarita* non urgens Comestum They objected to him amongst other Things That if his Doctrine was true it would not be lawful to venerate the Bones or Relics of Saints for after their Death there would remain no Matter that did belong to them This is one of the five Objections which he might easily resolve if we believe *Arriaga* who observes (I) that the Opinion of that Philosopher was not well understood He thinks therefore himself obliged to set it down faithfully and then he opposes it with some other Reasons *Peraxyla* says he, was not such a Mad man as to assert that Forms are not received in a Subject and that Man is only made up of a Soul He only said that the Subject to which Souls and other substantial Forms are united is a Compound of the four Elements, and not a first Matter and he asserted the same Simplicity to the Elements which is ascribed to the first Matter in the Schools of *Aristotle* (M) *Peraxyla* hic Author identissimè, in homine (N) idem effe deatus mixtum ultra formam substantialem dari aliqui d. substantiam recipiens illam formam

neque enim tam amens erat hic Author ut in homine et animalibus nihil aliud præter animam agnosceret et post mortem illius nihil remanere doceret quod esset vegetatione dignum in *Sandhu* et in quo manerent plura accidentia quæ prius fuerant in homine vivo putaret quæ cadavera nihil esse reale sed apparens et deludens sensus nostros vel saltem nihil illorum attica fuisse quo satisfaceret per omnibus in oppositum Venim in hoc recedit hic Author à vera et recepta sententia quod illud commune subjectum non dicit esse materiam primam sed ex quatuor elementis mixtum et inter se per mixtum putat coalescere Elementis autem ipsa omnino aditus simplicis sicut nos materiam primam vel formam ubi elementalem dicimus essentialiter simplicem Arriaga was of Opinion that the third Objection against *Peraxyla* was somewhat strong for it proved that one of the Elements produced from another was a thing naturally made out of nothing *Peraxyla* did not much trouble himself about it He (A) maintained that some Creatures have a Power to create and *Arriaga* approves his Opinion

(B) His Book intitled *Antonia Margarita* That Title alludes to his Father's and Mother's Name Don *Nicolas Antonio* speaks of that Book thus (b) *Antonia Margarita*, opus *Physicæ Medicinæ* ac *Theologicæ* utile et necessarium *Medicæ Campi* 1554 fol *Francforti* edito Item *novæ veterique Medicinæ* experimentum et evidentibus rationibus comprobata primam partem sile *Antonia Margarita* secundam quæ totum *Medicæ* est post priorem illam *Philosophicam* Hæc scilicet pars de *Febris* tractat cuius *febris* efficiuntur causas & species esse usque in hæc tempora ignota dilucide (uti Author ipse ait) de monstrat, *Galenum*que non dolo sed ignorantiæ excæcatum passim suum de hac re *Peraxyla* medicum posterius remissive evidenter docet An Anonymous Author (c) wrote a Spanish Book against him in the Year 1555 *Antonia Margarita* is grown very scarce It was in Mr *Brot*'s Library which was sold at Paris in the Year 1610 Mr *Fleur* bought it he had it for two *Louis* d or he showed it me and told me that he did not think he should have had it so cheap I think that Book and the whole Library of Mr *Fleur* is now in the Library of the Archbishop of *Rheims*

I find in the Bibliothecque (d) of the Writers that have been Physicians that *Peraxyla*'s Name was *Georgius Gmer* and that his *Antonia Margarita* in quoniam penit morborum diffusis proponitur was printed at (e) *Mexico* by *Antony Grasbeck* in the Year 1554 and 1587 and that he published in the same City in 1558 another Book in fol intitled *Nova veraque Mexici* in *Christiana ratione* comprobata *Kong* has committed several gross Mistakes speaking of that Author *Bruia* says he (f) *sententiæ prædictæ esse opere operoso et 30 annis elaboratæ esse* Every body will not perceive that the I Article was not omitted after that the word *prædicta* and they who do not perceive it will think it is a Riddle or laugh at it They will look upon *Peraxyla* as the greatest Fool that ever was for having spent 30 Years to prove that Beasts have a sensitive Soul On the other Side they who are sensible of that Omission will be apt to believe that this Spanish Physician had no other Design than to prove that Beasts have no Feeling whereas it is but a very small part of his Book *Kong* goes on and says *Ex eo omnia Cartesius hausisse quæ de hylurum quadam commentatus est* *Olaus Borrichius* in *Philosophia* addam eff This is false again We shall see by and that *Cartesius* was of that Opinion, before he heard of *Peraxyla* It is certain at least that the Book of that Spaniard could but make him believe

(a) Reiponderet *Gomefius* falsum esse nullam creaturam posse creare nec facile hanc solutionem redargueret ut infra patebit Id ibid

(b) A col *Antonia Margarita* Biblioth Scripior Hispania tom 1 pag 414 (c) Ad versum hanc scriptis Anonymi huius panum (f) Iulius Iunius Iuniorum tui En dicalo contra *Antonia Margarita* Medici Campi 1554 8 Id ibid (d) *Kind* in 5 reno 21 pag 3 8 (e) *Ve thymne Duelli* (f) *Kong* Biblioth 21 pag 3 8

(e) Read ad Aristotelis telic Me tra and n ad Aristotelis Commentaria

(f) Biblioth fol 92 verso

(g) *Gesnerus* says that *Jesephus* was printed in 1544

(h) In *quæstura* p 100 *Lugd Bat* 1667

(i) *Roa de Arriaga* Disput *Physica* Se 1 p 17

(k) Ibid pag 218

(l) Hæc argumenta non urgens *Gomefium* equat ali ter opinantem de entibus naturalibus quam res Authores sentiant

(m) Il ib

Republic of Learning I shall observe, that the (D) Epoch of that Opinion of *Cartesius* is falsly stated in that Book. If it be a strange Doctrine we ought not to wonder at it, for of all physical Objects, none is more abstruse and perplexing than the Souls of Beasts. The Extream Opinions about that Subject are absurd or very dangerous

*ex ista quoque suscipiendi difficultate a superis re-
cesserunt nec ullam arum corporum similitudinem
adignam sui parte inveniunt nihil ex men e fortis-
sime et ideo ratione caruerunt duo quoque tantum
adepta sunt sentire vel crederet. SAYS MAC OBUS (S)*

(x) Id ib
c 147 m
55

with this Restriction of Virgil Quantum non noxia
corpora tardans Terrenique debetant artus because
as he goes on in animalibus hebetat usus animi
DENSITATE corporum which seems to be tranla-
ted from Diogenes who says that Beasts can have
no Feeling nor Knowledge, by reason of the THICK-
NESS and great density of their Bodies. See
Plutarch *de animarum* 20 It seems to say, that
Macrobis *de somniis* 1 from Diogenes that it is
likely enough that he made this word, it is
Word; but I shall now very well know what

(fb) Virgil
En 1 6
v 31

with his (h) *noxia corpora* had in view what
in Diogenes That Beasts are like Mad men deprived
of Reason *δαιμονιοι τοις μανιακοις παρομοιαζοντες*
τὸ πρὸς νουμωτικόν For tho' the Word *noxia* im-
plies Damage and Loss yet *μάνησι* seems to sig-
nify something more and therefore a Cynick
Commentator to make us apprehend it explains
it by the Image of Men posses'd with Devils. He
says That when Humane Souls go out of the Bo-
dies, and look for another Habitation if they
meet with no other Subjects but such wherein Reason
never dwelt they follow and harass them and
never inform them as they do Organized Bodies
design'd for them *δαιμόνες οὐκ ἄλλοι τῶν πνευ-
ματων* But you will tell me that these
are Platonick Thoughts which do not very
well agree with the common Notions we have of
Cynism I cannot help it *Sallust* the Cynick
says So Besides Diogenes was not so far from Pla-
tonism as is commonly thought A certain Ty-
berianus tells us in his *Societate* that Diogenes pos-
sessed himself of the whole Philosophical Patrimony
of Plato *Memores Platonis sententia cuius he
reditatem Diogenes Cynicus invadens nihil ibi plus
(1) acceit lingua inveniit*

(1) In
the Art of
Living
well That
Passage of
Tiberia-
nus is quoted
upon the Account
of Virgil's
Golden
Bough

But what I say of Diogenes will better appear
from the Idea of his Morals His Opinion was
that if a Man will live as he ought to do he must
be insensible and tho' this seems a strange and
almost impossible thing yet that Philosopher
must needs have attained to that Philosophical
State of Life for the Ancients are too positive
about it to be deceiv'd in it. I don't know whe-
ther in order to it he made use of Chiron's Pre-
cepts mention'd by Maximus Tyrius I don't know
neither whether he followed the Rules of Anti-
sthenes who is the Author of the *Apathia* but as
he was an Angel of Jupiter sent to Men to teach em
what is Good and what is Evil as Epictetus says I
am apt to believe that he was directed by his own
Thoughts As he us'd to say that Reason must be
opposed to Passion Courage to Fortune and Nature
to Custom he resolv'd at last to follow the Design
of Nature and sanfied that whoever will be a
true Son of that good Mother ought to be like
Pearls who are a genuine and true Image thereof
Diogenes embraced therefore that Opinion and put
it in practice by Poverty, Fasting, and Alceuticks,
which he had the Honour to invent This said
that Alexander the Great, being ready to undertake
the Conquest of India and being sure of his De-
stiny had so much Courage as to wish to be Dio-
genes He envied the Securiety of that Philosopher
and a Cynical Life seem'd to him to exceed Nature

(1) Senec
de brevitate
vite

(1) Disputare um Socrate licet dubitare cum Car-
neade cum Epicuro quiescere in his Naturam cum
Stoicis vincere cum CYNICIS EXCEEDERE Such an
Insensibility is a very good State and whoever
attained to it, paid always very dear for it *istuc
nihil dolere non sine maximo prececede contigit imma-
nitas in animo, stupor in corpore* But it is a very
convenient State for the Mortals of this Life Eve-
ry Heathen here has been glad If what has been said of
[A] certain Nations not unknown to you should
have been said of them *Vident verba vestitus
pelles cubile humas Ad beatiss arborifera, quam
generare agris Illaborat domibus solum alienisque for-
tunas sibi metusque vertere Senec adversus homines
secundum adversus Deos rem difficillimam assecuti sunt,
ut illis ne voto quidem opus sit*

(k) Cicero
Tus Quasi
1 3

If I could often present my Readers with a bor-
rowed Erudition as exquisite and profound as this
how great an Ornament would it be to this Dic-
tionary? I shall quote (1) some Passages of Aristotle,
which seem to prove that he took Beasts for Ma-
chines

(1) In the
Rome. M.

(D) The Epoch of that Opinion of Cartesius is falsly
stated (a) "Gomesius Pereira inferred not his Pa-
radox from its true Principles, and did not fore-
see the Consequences of it and therefore Descartes
may be look'd upon as the first who found it
out by a philosophical Method Yet I think it
is very probable that he found it without looking
for it it is likely that he begun and ended his
Meditations without thinking of the Souls of
Beasts and without forsaking the Opinion he had
of them from his tender Years but when he
began to consider the Consequences of his Prin-
ciple concerning the Distinction between Think-
ing and extended Substances he perceived that
the Knowledge of Beasts destroyed the whole
Oeconomy of his System May it may be that
this Difficulty did not come into his Mind before
it was objected to him He was therefore necessi-
tated to assert that Beasts have no Feeling Had
he been able to defend his Principles without it
he had never oppos'd an Opinion which has in it
only appear'd undeniable to every Body, but it
is attended with an Evidence almost invincible
That we may know whether that Author was mis-
taken let us see how he explain'd himself His
Explication is to be found at the End of his Preface
for it was published in the same Book as well as the
Passage which wanted to be cleared (b) I have said
in the second Article of these News that it is likely
that Mr Descartes begun and ended his Meditations,
without thinking of the Souls of Beasts and with-
out forsaking the Opinion he had of them from his
tender Years It would be a mistake if I mean
his six famous Meditations, which were dedicated
to the Sorbon and against which they raised so
many Objections for it does plainly appear from
his *Method* printed in the Year 1637 before
those six Meditations that Mr Descartes be-
liev'd already that Beasts have no Souls I declare
therefore that by Mr Descartes's Meditations I
did not mean those which he dedicated to the
Sorbon My meaning is that as likely he built a
new System in his Mind, without thinking of the
sensitive Souls of Beasts I don't doubt but he
finish'd the Construction of his Work in his Mind
before he published his *Method* It is certain
notwithstanding this Explication that that Author
was mistaken for the Hypothesis about *Automata* is
one of the most Ancient Speculations of Descartes
as Mr Baillet has made it out Here are his Words

(a) News
from the
Republic
of Learn-
ing, March
1684 p 32

(b) Ibid
at the End
of the Pre-
face

(c) Those who suppose that those Works of Mr
Descartes were compos'd in the Year 1619 take
his Opinion about the Souls of Beasts twenty
Years older than his Adversaries, and some learn-
ed Men besides that That Opinion was found in
the Works which he writ in his Youth and
therefore it cannot be said that he begun and
ended his Meditations without thinking of the
Souls of Beasts and without forsaking the Opinion
he had of them from his tender Years It cannot
be said that when he came to consider the Consequen-
ces of his Principle concerning the Distinction be-
tween Thinking and Extended Substances he
perceived that the Knowledge of Beasts destroyed
the whole Oeconomy of his System It cannot
be said that the Answers which he was oblig'd to
make to some Objections propos'd against him
gave him Occasion to think of a thing for
which he was only beholden to the freedom
of his Thoughts He was not yet necessitated to
assert that Beasts have no Feeling, since he
could not foresee what might happen to him
twenty Years after He had then no Prin-
ciples to defend for he had laid down none
yet for the New Philosophy at least he had
not yet read at that Age *St Augustin* not Te-
rrentia nor any Author from whom he might
have had that Opinion concerning the Souls
of Beasts Mr Descartes being returned from

(c) Baillet,
Life of
Descartes.
tom 1 p
51 52.

Many Readers will say, that I am too long, but the Learned will think that I do not say the fourth part of what they might say upon that Subject. They will say the same thing of some other places, wherein I am somewhat prolix. Afterwards I shall make some (F) Reflections. I shall observe that *Vassus* knew no Author before

(3) *Quaest. Platon.*

partem divinitatis esse. *Plutarchus* (3). Η δὲ διὰ τὴν μετὰ τὴν φύσιν καὶ λογισμὸν καὶ ἐργον ὅτι τὸ θεῖον καὶ ἄλλὰ καὶ μὴ καὶ ὡς αὐτὴ ἀλλὰ ἀπὸ αὐτῆς καὶ αὐτὴ ἴσους. Anima mentis & ratiocinationis consortors non opus solum Dei sed & PARS est neque ab ipso sed ex ipso est facta. Enimvero etiam alia (hac ratione) partes Dei id est mundanae animae sed ista scilicet eximi & quae proximā vim naturaeque eius referet. Therefore how could they believe that the Souls of Beasts had no feeling? I don't think they believed it and if *Seneca* said the contrary in the Passages mention'd by the Learned Mr *du Rondel* tis plain he has reluc'd himself in some others. Read his last Letter and you will see that he deprives Beasts of Reason, Wisdom, Goodness and Felicity and of feeling. *Plutarchus* non potest beata vita esse nec id potest quod anima beata potest beata autem ut i bonis efficitur in multis animalibus non est quo beati ut efficitur ergo in isto animali b num non est. Mutum animal SENSU comprehendit praesentia praeteritum remissum cum id incidit quo sensus admonetur tanquam equus reminiscitur via cum ad initium ejus admotus est. In statu quo dem nulla via plurimus saepe calcavit memoria est. Nec illud neg ad ea quae videntur secundum naturam magnos esse mutis animalibus impetus qz concitatos sed inordinatos ac turbidos. Nunquam autem aut inordinatum est bonum aut turbadum. Quid ergo inquis muta animalia perturbat qz indisciplinatos movetur? Dicerem illa perturbat qz indisciplinatos movetur si natura illorum ordinem caperet. nunc moventur secundum naturam suam. Pervertuntur enim id est quod esse aliquando qz non perturbatum potest. Sollicitum est quod potest esse securum. Nulli virtutum est nisi cum virtus potest esse. Multis animalibus talis est sua natura mutis est. Sed ne te di teneam aliquod erit bonum in mutis animalibus est aliqua virtus erit aliquid perfectum sed quale? nec bonum absolute nec virtus nec perfectum. Haec enim rationalibus solis contingunt quibus datum est sine quare quatenus quemadmodum. Ita bonum in nullo est nisi in quo ratio. *Seneca* lays down a Principle whereby it will appear in what sense he says elsewhere that Beasts don't grow angry and are not capable of conferring a Benefit. He supposes that a Nature which is not susceptible of the two Contraries is susceptible of neither of them. From whence he concludes that Beasts being not capable of acting according to Order and the Rules of Reason and being unable to acquire Virtue do nothing that can be called disorderly unreasonable and a vicious Action and therefore he does not call Anger the Violence or Fury of a Lyon for according to the Stoicks all Passions are as many Vices and consequently no Being can be liable to them but such as partake of Virtue and Reason and are able to attain to the Perfection of a Wiseman. See the Remark H. He asserts positively in another (h) Letter that Beasts Feel and he could not have express'd himself more clearly if he had been of our Schoolmen's Opinion. (i) Qualis ad nos pervenit animi nostri sensus quomodo naturam ejus ignoremus ad sedem talis ad omnia animalia constitutis suae SENSUS. Necessè est enim id SENTIANT per quod alia quae SENTIUNT necessè est SENSUM ejus sentire cui parent, a quo eorum. Nemo non potest intelligi esse aliquid quod impetus suos moveat. Sed si illud ignorat qz consensum sibi esse sentit. Quid sit aut unde sit nescit. Si insensibilibus sic quoque animalibus principalis partis suae SENSUS est non satis elucidatus non expressus. And herein he does but follow the Principles of his Sect. It is the Property of Beasts, said the Stoicks to desire their Preservation, and to know that Nature recommends them to themselves. (k) Τὸν δὲ

(8) *Seneca Epist. 124 p. 477*

μὴν οὐκ ὁρᾷ τὸν οὐρανὸν οὐδὲ τὴν γῆν οὐδὲ τὸν ποταμὸν οὐδὲ τὸν ὄμιλον οὐδὲ τὸν ἀνθρώπου οὐδὲ τὸν θεόν. *Seneca* says that the Soul of a Beast is not capable of seeing the Heavens, the Earth, the Rivers, the Multitude, the Man, or the God. *Plutarchus* non potest beata vita esse nec id potest quod anima beata potest beata autem ut i bonis efficitur in multis animalibus non est quo beati ut efficitur ergo in isto animali b num non est. Mutum animal SENSU comprehendit praesentia praeteritum remissum cum id incidit quo sensus admonetur tanquam equus reminiscitur via cum ad initium ejus admotus est. In statu quo dem nulla via plurimus saepe calcavit memoria est. Nec illud neg ad ea quae videntur secundum naturam magnos esse mutis animalibus impetus qz concitatos sed inordinatos ac turbidos. Nunquam autem aut inordinatum est bonum aut turbadum. Quid ergo inquis muta animalia perturbat qz indisciplinatos movetur? Dicerem illa perturbat qz indisciplinatos movetur si natura illorum ordinem caperet. nunc moventur secundum naturam suam. Pervertuntur enim id est quod esse aliquando qz non perturbatum potest. Sollicitum est quod potest esse securum. Nulli virtutum est nisi cum virtus potest esse. Multis animalibus talis est sua natura mutis est. Sed ne te di teneam aliquod erit bonum in mutis animalibus est aliqua virtus erit aliquid perfectum sed quale? nec bonum absolute nec virtus nec perfectum. Haec enim rationalibus solis contingunt quibus datum est sine quare quatenus quemadmodum. Ita bonum in nullo est nisi in quo ratio. *Seneca* lays down a Principle whereby it will appear in what sense he says elsewhere that Beasts don't grow angry and are not capable of conferring a Benefit. He supposes that a Nature which is not susceptible of the two Contraries is susceptible of neither of them. From whence he concludes that Beasts being not capable of acting according to Order and the Rules of Reason and being unable to acquire Virtue do nothing that can be called disorderly unreasonable and a vicious Action and therefore he does not call Anger the Violence or Fury of a Lyon for according to the Stoicks all Passions are as many Vices and consequently no Being can be liable to them but such as partake of Virtue and Reason and are able to attain to the Perfection of a Wiseman. See the Remark H. He asserts positively in another (h) Letter that Beasts Feel and he could not have express'd himself more clearly if he had been of our Schoolmen's Opinion. (i) Qualis ad nos pervenit animi nostri sensus quomodo naturam ejus ignoremus ad sedem talis ad omnia animalia constitutis suae SENSUS. Necessè est enim id SENTIANT per quod alia quae SENTIUNT necessè est SENSUM ejus sentire cui parent, a quo eorum. Nemo non potest intelligi esse aliquid quod impetus suos moveat. Sed si illud ignorat qz consensum sibi esse sentit. Quid sit aut unde sit nescit. Si insensibilibus sic quoque animalibus principalis partis suae SENSUS est non satis elucidatus non expressus. And herein he does but follow the Principles of his Sect. It is the Property of Beasts, said the Stoicks to desire their Preservation, and to know that Nature recommends them to themselves. (k) Τὸν δὲ

(b) *Tis the 121 Letter wherein he proves omnibus animalibus esse constitutis onis suae sensum*

(c) *Id Epist. 121 pag. 457*

(k) *Diag. Laert. in Zenone 17 n. 85 p. m. 416*

(l) *Plutarchus in Seneca*

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mention'd by Mr *du Rondel* says positively. That in the Opinion of *Diogenes* Beasts had no feeling. I would see the Doctrine of that Philosopher more at large for what *Plutarch* says of it is very dark the beginning and the end are very inconsistent with the middle part. They partake of Understanding there's the beginning. They are always affected as Madmen are there's the end. But don't Mad and Frenzied Men often Feel? If they had been compar'd with Men sick of a Lethargy or Apoplexy there had been some connection in his Discourse. How ever here is the whole Passage. (m) Διογένης μὲν γὰρ οὐκ ὁρᾷ τὸν οὐρανὸν καὶ τὴν γῆν οὐδὲ τὸν ποταμὸν οὐδὲ τὸν ὄμιλον οὐδὲ τὸν ἀνθρώπου οὐδὲ τὸν θεόν. *Diogenes* non potest beata vita esse nec id potest quod anima beata potest beata autem ut i bonis efficitur in multis animalibus non est quo beati ut efficitur ergo in isto animali b num non est. Mutum animal SENSU comprehendit praesentia praeteritum remissum cum id incidit quo sensus admonetur tanquam equus reminiscitur via cum ad initium ejus admotus est. In statu quo dem nulla via plurimus saepe calcavit memoria est. Nec illud neg ad ea quae videntur secundum naturam magnos esse mutis animalibus impetus qz concitatos sed inordinatos ac turbidos. Nunquam autem aut inordinatum est bonum aut turbadum. Quid ergo inquis muta animalia perturbat qz indisciplinatos movetur? Dicerem illa perturbat qz indisciplinatos movetur si natura illorum ordinem caperet. nunc moventur secundum naturam suam. Pervertuntur enim id est quod esse aliquando qz non perturbatum potest. Sollicitum est quod potest esse securum. Nulli virtutum est nisi cum virtus potest esse. Multis animalibus talis est sua natura mutis est. Sed ne te di teneam aliquod erit bonum in mutis animalibus est aliqua virtus erit aliquid perfectum sed quale? nec bonum absolute nec virtus nec perfectum. Haec enim rationalibus solis contingunt quibus datum est sine quare quatenus quemadmodum. Ita bonum in nullo est nisi in quo ratio. *Seneca* lays down a Principle whereby it will appear in what sense he says elsewhere that Beasts don't grow angry and are not capable of conferring a Benefit. He supposes that a Nature which is not susceptible of the two Contraries is susceptible of neither of them. From whence he concludes that Beasts being not capable of acting according to Order and the Rules of Reason and being unable to acquire Virtue do nothing that can be called disorderly unreasonable and a vicious Action and therefore he does not call Anger the Violence or Fury of a Lyon for according to the Stoicks all Passions are as many Vices and consequently no Being can be liable to them but such as partake of Virtue and Reason and are able to attain to the Perfection of a Wiseman. See the Remark H. He asserts positively in another (h) Letter that Beasts Feel and he could not have express'd himself more clearly if he had been of our Schoolmen's Opinion. (i) Qualis ad nos pervenit animi nostri sensus quomodo naturam ejus ignoremus ad sedem talis ad omnia animalia constitutis suae SENSUS. Necessè est enim id SENTIANT per quod alia quae SENTIUNT necessè est SENSUM ejus sentire cui parent, a quo eorum. Nemo non potest intelligi esse aliquid quod impetus suos moveat. Sed si illud ignorat qz consensum sibi esse sentit. Quid sit aut unde sit nescit. Si insensibilibus sic quoque animalibus principalis partis suae SENSUS est non satis elucidatus non expressus. And herein he does but follow the Principles of his Sect. It is the Property of Beasts, said the Stoicks to desire their Preservation, and to know that Nature recommends them to themselves. (k) Τὸν δὲ

(m) *Plut. de Placit. Philo. 15 c. 30 p. 909*

(n) *Plut. de Placit. Philo. 15 c. 30 p. 909*

(o) *Plut. de Placit. Philo. 15 c. 30 p. 909*

(p) *Plut. de Placit. Philo. 15 c. 30 p. 909*

(q) *Plut. de Placit. Philo. 15 c. 30 p. 909*

(r) *Plut. de Placit. Philo. 15 c. 30 p. 909*

(s) *Plut. de Placit. Philo. 15 c. 30 p. 909*

referred in vain to the fourth Book of *Cicero's Tusculanæ Questiones*, and to the Testimony of *Porphyry, Proclus, &c* There is no (*HA*) resemblance between Mr *Descartes's* Opinion about Beasts, and what those Ancient Authors say

PERLZ

Machines whilst they are able to form the Image of an Object that is absent This is what Memory implies according to the very explication of *Plato* in the *Phædrus* Lately That *Jesuit* had no reason to oppose the Critical Observation made against (*b*) the Translator of *Aristotle* Βαλυνδαι is a kind of Thought and not Thought in general so that the Man only were capable of the *Βαλυνδαι* as *Aristotle* will have it yet it would not follow from thence that there is no other Animal but Man that thinks

(*HA*) We are also referred in vain to the fourth Book of *Cicero's Tusculanæ Questiones*

There is no resemblance (*c*) A Learned *French* who wrote against *Descartes* accuses him of advancing no Doctrine but what is to be found in the Authors who lived before him Here are his proofs with respect to the Doctrine concerning the Souls of Beasts

(*c*) *Quid hoc est verum quod (1) apud Ciceronem legitur, bestias simile quiddam facere perturbationem in animis in perturbationibus non incidere quia eorum non est in eis asserationes rationis quia carent beati? Quid aliud inquam suadet hoc nobis quoniam bestias mera esse automata? nam si perturbationibus carent neque herum diliget carnis neque lipum omnes reformidat uno nec cibum appetunt nec dolorem fugiunt nec mortem timeant sed ex coacta causa in ter a motu id facere videtur quod non faciunt Scribitur concisus verbis (2) *Plutarchus* creditur Diogenem brutas animantes neque intelligere neque sentire Quid ergo confutavit (3) *Torphyrius* Scitavit (4) *Proclus* animalia tantum attonia anima esse prædita addidit decretum esse à Platone animam vere esse eam que ratione pollat ceteras simulacra an maius At nemo doctrinam hanc vel tradidit apertum vel suis persequutus quæ *Gomietius* Pererita He alleges four Authorities viz of *Cicero* *Plutarch* *Porphyry* and *Proclus* Let us examine them one after another we need not say any thing more about *Pererita* whom that Learned Prelate mentions in the last words of that Passage We have said enough of him in the foregoing Remarks*

The Passage of *Cicero* is not a good Proof it contains nothing else but the Distinction which the Stoicks made use of and which I have mentioned in another place They pretended that Passions and Reason were two things contrary one to another and consequently that they could have but one and the same Subject they could not therefore be found in any Animals but such as are rational and consequently Beasts could not be capable of them (*d*) *Il* *animorum corporumque dissimile est quod animi valentes morbo tentari non possunt corpora possunt Sed corporum affectiones sine culpa accipiunt possunt animi non item quoniam omnes morbi per perturbationes ex asseratione rationis eorum Itaque in hominibus solus existunt Nam bestias simile quiddam faciunt sed in perturbationibus non non differunt Tilius *Cicero* repeats its part of the (*e*) Stoical Subtilities about the Doctrine of Passions What he says does not at all signify that the Stoicks deprived Beasts of the Sentiments which we call Love Hatred Anger &c They acknowledged that Beasts do something like what Men do when they grow angry and give them selves up to Pleasures Fear or some other Passion but they pretended that such a State was not really Love or Hatred or Anger or in general a Passion in Beasts to be such said they Beasts must fall into it out of Contempt of Reason But they are irrational and consequently Reason is not their Rule they do nothing which tends to swerve from that Rule or to conform to it Seeing therefore Passions arise in Men because they swerve from Reason which is their Rule and since the nature of Passions consists in being contrary to Reason which Men ought to follow it must be concluded that what passes in Beasts is not a Passion tho it seems to be one This is what the subtleties of the Stoicks came to It was properly speaking a dispute about Words and it is at least very certain that they did not deny that what the other Philosophers call Anger or Love or Fear in Beasts was a true and real Sentiment They did not deny that a Dog knew his Master and that a Sheep knew a Wolf as a thing they ought to avoid I will not make a Collection of proofs whereby the truth of that Fact might appear with the greatest Evidence It is enough to say That those who affected most to refuse*

what was Paradoxical in the System of the Stoicks, never objected to them that they made meer Machines of Beasts Would they have spared them about such a Doctrine?

II I have already examined the Passage of *Plutarch* We have already seen that it is obscure and made up of discordant Parts I add that one may plainly observe in it an extreme opposition between the Doctrine of *Diogenes* and that of Mr *Descartes* *Diogenes* said that Beasts are made up of a Body and a Soul and that if their Soul does not actually Feel and Reason is because the thickness of its Organs and the great quantity of Humours reduce it to the Condition of Mad men Whereas *Descartes* acknowledges no sensitive Principle in Beasts he says They are only made up of Matter and have a Body without a Soul I observe That if there was any probability in the Doctrine of *Diogenes* it would be only about Oxen Horses &c but it appears ridiculous when it is applied to Swallows Flies &c and Ants whose Organs are incomparably thinner and less moist than those of Men

III I shall insist some what longer upon the Passage of *Porphyry* The Learned Bishop affirms That that Philosopher refused what *Diogenes* said of Beasts That they had neither Understanding nor Feeling but it is certain that *Porphyry* refuses no body who had said that they are insensible His Silence is a formal proof that no body had yet vented such a Paradox for there being nothing more contrary to the Design of *Porphyry's* Work he had not failed to refute that Hypothesis He was about to prove that Men should not eat the flesh of beasts He found several Inconveniences in it and amongst others (*f*) that it is an Introduction to Cruelty He gathered together as many Answers as he could get to the Objections of his Adversaries But was there any Objection so strong as this viz That beasts have no Feeling? Is it not certain that this being supposed there would be no more Cruelty (*g*) in killing an Ox than in plucking out Turneps? Here is another Observation which persuades me that *Porphyry* had not heard of that Paradox which is pretended that he refuted He lays down as a Principle generally approved (*h*) that Beasts are insensible from whence he draws this Consequence (*i*) They are therefore Rational and he finds in that Consequence the most specious Arguments he can alledge to defend his Opinion He proposes this Objection to himself (*k*) Seeing the Animal Nature includes some Rational Subtleties it must also include some that are Irrational and he answers as *Plutarch* does or rather he translates word for word three or four pages of *Plutarch* without naming him What he steals from him contains amongst other things what has been seen above in the Remark *c* They are two Passages which demonstratively prove That all the Philosophers of that time believed that there are no Insensible Animals *Amyot* has to all translated the fifth that it is impossible to understand the meaning of it he has been more successful in the second I shall set down his words and I shall say by and by why I do it in this place

(*l*) As for those who speak so impertinently of it as to say that Beasts neither Rejoice nor grow Angry nor Fear that the Swallow makes no provision that the Bee has no Memory but that it seems only that the Swallow has some forecath that the Lion seems to be Angry and the Hind that to quake with Fear I don't know how they could answer those who should say that one may as well affirm that they neither See nor Hear and have no Voice but that they seem only to See and Hear and have a Voice and in short that they don't more against plain Evidence than the one is I have transcribed that Passage to strengthen the Consequence I drew from it That the Doctrine of Automata was then looked upon not as a Doctrine which had ever been asserted by any Body but as a Doctrine which the Stoicks would not be able to refuse if any one should undertake to make use of such an Objection to bear them at their own Weapons I perhaps it will be said that *Plutarch* and *Porphyry* use the word *λογος* which is the Participle of the Present Tense from where

(*f*) *Porphyrius* de Abstin. l. 3 c. 20 p. 125 Can. talr. 1655 See also cap. 19 p. 122

(*g*) I do not say but if it would thereby use the selves to feed Elod and grow by de grees less Compassionate and more cruel to the flesh of their kind

(*h*) *Id* ib. c. 21

(*i*) *Id* ib. c. 1 p. 101 c. 21 22 *Cratylus*

(*k*) *Id* ib. c. 7 p. 109

(*l*) *Plutarchus* *What Animals are most wary* p. 11 in 470 *Amyot's* *l'effron* Geneva 15 i in 8

(*b*) By *Scaliger* See *Pardies* ib. n. 72 p. 140

(*c*) *Pet. Daniel Hu* *etius Conf* *Philos* *Cartesiane* c. 8 p. 208 *Paris* 1689

(*d*) *Cicero* *Tuscul. l. 4* *Philos* *de Placit* *Philosoph* l. 5 c. 20 (*e*) *Torphyrius* *de abst. ab anim.* l. 2 (*f*) *Proclus* in *Platon* *Philos* l. 3 c. 1

(*d*) *Cicero* *Tuscul. l. 4* *fol.* m. 267 *C*

(*e*) *Habes* *ca. quæ de perturbationibus enucleatè disputant* *Stoici* *quæ logica appellantur* *quæ diffinitur* *rumur* *subtilius* *ib.*

PERGAMUM, a City of *Asia* in *Mysia*, became very famous under the Kings who succeeded *Phileterus*. Its Situation was very advantageous (2) It was at first a Fortrefs built upon a Mountain *Lysimachus* one of *Alexanders* Successors, shut up his Treasures in it, and gave the Government of it to a Man who taking hold of the present Junctures made (B) himself Master of it, as we shall see (C) The

band fell a reading and was surprized to find that St. *Theresa* had two fathers the first was king *Dom Bermude* and the second *Aloñse Sanchez de Cepede* (g) Tis suppoed that this Discourte was made upon Occasion of St. *Theresa's* Canonization in the Year 1522 The Author of that Book was not of the Protestant Religion he speaks very ill of the Protestants

(A) Its Situation was very Advantageous I respect
 ally because of the Convenience of the Rivers (B)
 Longue Clarissimum Aflix e iugum quoq intermet
 Sinus prefluit Cetius profusa l'adno monte Tays
 Pliny I wonder that he said nothing of the Cacus
 another River which ran near Pergamum and the
 only one mention'd by Strabo in the Description of
 City (C) Παρρηπίς δὲ καὶ ἡ τοῦ Περσέως
 ποταμὸς καὶ τῆς Κασίας πύργου νοτίῳι ἐκείνη
 ποταμὸν ἀπὸ τοῦ πελάγους ἐκείνου ἐκείνη
 ποταμὸν ἀπὸ τοῦ πελάγους ἐκείνου ἐκείνη
 Μουσας e iugum præfuit Cæcus per campum val'
 opulentum qui Cæcus dicitur ac ferè optimam partem
 h'isic

(B) Made himself Master of it] His Name was *Phileterus*. He had been an Eunuch ever since his Infancy by an Accident. His Nurse who carried him to a Funeral Pomp was so crowded by the Spectators that the Child's Testicles were altogether crushed. (*K*) Συρεθησαν γαρ τινι παρὰ τὴν αἰσιν ἐκ παλαιῶν τὰς ὡν σπλάγχθων ἐν τῷ χυλῳ τῆς κοιλίας οὕτως πρὸς τὸν τι φιλᾶται ἐν τῇ νουρίᾳ ἀλλήλοισι ἀδελφοί μου καὶ αὐτῶν ἐναὶ περὶ τοὺς πόδας ἐν πυρὶ δύναιτο. & Ναρι ἐφ' ἑαυτοῦ quodam fenebris in magna libidinum f equeutia nuxum cum gestans etiamnum infansem in turbatione deprehensū adeo super oppressa ut pueri etiam colluderentur genitalia. Erat ergo eunuchus. He was so well educated that he made himself capable of Noble Employments and he lived without doubt the Reputation of an honest Man since *Lysimachus* trusted him with the Government of the Fortresses wherein all his Treasures were. *Phileterus* was very faithful to his Trust till he found himself persecuted by the Calumnies of *Aisinos*. *Lysimachus*'s Wife From that time he began to withdraw him self from his Allegiance and to take some Measures to maintain himself in the Independency, with the help of his Juncture friends, particularly favouring one man whom *Lysimachus* bore troubled with double Division was forced to put his Son *Agathobulus* to Death. Nevertheless he was oppressed by *Selenicus* Nicator and at last killed by the Treachery of *Ptolemy Cornutus*. During those Epochs *Phileterus*

(1) Son of
Eumenes
Brother of
Phileta
rus

(m) Taken
from Stra
bo l 12
pag 428
429

(n) Lucian
in macrobi

50) Athen
13 pag

(p) Strabo
l i p
234

(q) Lome

biothecis
e 6 p 96

(r) Plin
13 c 11
m 78.

19

[illegible][illegible]

manus infinit rebo expudat qd micitus studio non
 minoribus indultibus ad eodem nam tendat
 Alexandris compari. Telle are the Words of *Pliny*
 which plainly signify that *Probus* the *Cd* *Phi*
 adelphus adorned the City of *Alexandria* with a fine
 Library. In Emulation of that which the Kings of
Pergamum had set up in the chief Town of their
 Country. *Luffs* is in the right to say that this is
 the Library of *Alexandria* was set up betwixt
 the Kings of *Pergamum* who made a Collection of
 books were born. This is not inconsistent with
 what *Pliny* says of the Emulation of *Titus* and
Vespasianus for without doubt the King of *Egypt* who
 lived in the time of *Emmenas* was a Prince who
 the King of *Pergamum* was able to obscure the
 Emulation of the *Alexandria* Library. It is to be
 observed that the Emulation of those Prince occa-
 sioned many Impostures about Books a *lib* *in* *cl*
urves. *Cd* *Scribit Galen* *C* *ment* *i* *in* *lib* *Hip*
crates *de* *natura* *h* *um* *int* *Al* *zand* *i* *per* *Pergam* *reges*
emulationem *fuisse* *pl* *zua* *veterum* *lib* *mina* *com*
pararet *Tunc* *vero* *multo* *ma* *ab* *hominibus* *pecunie* *re*
is *falls* *auctorum* *nominibus* *libros* *in* *ceptor* *os* *q* *o*
et *authoritas* *plurimum* *is* *et* *authoritas* *dece* *i* *l*
 have just now found in a fine Book. *(f)* That it

is thought the Kings of Pergamum began to adorn their City with a *Library* and that *Attalus* made his *Library* twenty two Years before that of *Alexandria*. I do not criticize the Author of that book for what he says that is thought to be fairly true of several People. Many Perfoms may be of that I refutation. I only say that they are in mistake. The first of the Kings of *Pergamum* who was named

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once very Beneficial (B) to the Athenians They were so unjust as to su
sp. &

at the Cause It was the Philosopher's Business
lays he to explain from whence and how that only
Horn was formed but it was the Diviner's Duty to
declare why it was formed and what it portended
For they who say that as soon as a natural Reason
is found out the Prodigy vanishes away are not
aware that they destroy Artificial as well as Celestial
Signs Watch Lights upon Towers Sun Dyals &c
depend upon certain Causes which act according
to certain Rules yet they are appointed to signify
certain Things This is the most specious and
strongest Reason that can be alleged for the Vulgar
Opinion which Anaxagoras opposed That a natu-
ral Phenomenon may be a Prophecy or a sign of a
future Evil it is not at all necessary that Philoso-
phers should not be able to give any Account of it
for tho they may explain it by the natural Virtues
of Second Causes yet it may very well be appointed
to preface something Watch Lights are explained
by natural Reasons nevertheless they are a sign of
the Course which things ought to steer It must be
therefore confessed that Plutarch has defended the
common Opinion as learnedly as it can be maintain-
ed The Efficient Cause when found out does not
exclude the Final Cause and even necessarily sup-
poses it in every Action directed by an Intelligent
Being What Grounds do therefore Philosophers
go upon when they maintain that Eclipses being a
natural Consequence of the Motion of Planets can
not be a Preface of the Death of a King and that
the overflowing of Rivers being a natural Effect of
Rains or melted snows cannot portend a Sedition
the dethroning of a Prince or such like publick Calamities
I answer that they are of that Opinion
because the Effects of Nature cannot be Prefaces of
Future Contingents unless they be appointed for
that End by a particular Intelligent Being It is
evident that the Laws of Nature being left to their
general Course would never raise any Towers nor
let up Watch Lights upon them for the Use of Kings
It must be the Work of Men it is necessary
that their particular Wills should apply the Virtue
of Bodies in such a Manner as may relate to the
End which they propose to themselves On the
other hand it is manifest that the Laws of Na-
ture being left in their general Course cannot pro-
duce any Meteors or the overflowing of a River
whereby the Inhabitants of a Kingdom may know
that there will arise a Sedition in two or three
Years time which will overthrow the Monarchy
It is manifest that a particular Intelligent Being must
needs form those Meteors or those great Inundations
that they may be the Signs of a Change of Go-
vernment But then it will be impossible to explain
them by physical Reasons for that which depends
upon the particular Will of a Man or an Angel is
not the Object of a Science the Causes thereof
cannot be found out by Philosophy From whence
it follows 1 That an Event which may be explain-
ed by physical Reasons is not a Preface of a Fu-
ture Contingent and that such a Preface cannot be
explained by the Laws of Nature So that when
Plutarch says that the Diviner found out the Final
Cause and the Philosopher the Efficient Cause he
must suppose that a particular Spirit so dispos-
ed the Soul of that King that his Brains being stir-
red, and ending sharp over against the middle of
the Forehead produced but one Horn which came
out in that very place He must also suppose that that
Spirit modified the Brains of that King in such a man-
ner to the end that the Athenians might know that the
Faction of Pericles would oppress that of Themistocles
and have all the lower in his Hands but the Suppo-
sition being contrary to the Notions whereby we
know that none but God can foresee future Con-
tingents cannot be admitted and so the Vulgar
Opinion about Prefaces cannot be adopted without
acknowledging that God produces miraculously and
by a particular Will all the Natural Effects which are
looked upon as Prognosticks According to that
Supposition Miracles properly so call'd would be
almost as frequent as Natural Effects which is a
prodigious Absurdity Observe that if God had
been willing to work a Miracle to inform the Athe-
nians that one of their Factions would be destroyed
he need not straiten the Brains of that King
He would have produced a Horn in the middle of
the Forehead without making any Alteration in

the Brains which would have set the Prodigy in a
greater Light However I hope the Reader will
not find fault with me for having made a Reflection
upon a Thought of Plutarch which is so specious
that it might seem to most Readers to be a solid One
(B) An Account of Eclipses which proved once very
Beneficial to the Athenians I shall let down a brief
Sketch of Plutarch which concerns a Naval Expedi-
tion in the Beginning of the Peloponnesian War (A)
And now the Vessels having their Complement of
Men and Iercles being gone aboard the Admir-
al own Galley it happen'd that the Sun was
in an Eclipse and it grew dark on a sudden to
the extreme Affrightment of them all looking
upon it as a dismal Token and an unlucky ill
boding Omen Wherefore Pericles perceiving the
Pilot or Steersman seized with a great fear and
at a stand what to do he took his Cloak and put
it before the Man's Face and muffled him up in
it that he could not see he asked him whether he
did imagin there was any dreadful Thing or great
Hurt in this that he had done to him or whether
he thought it was the Sign of any Hurt he an-
swering no Why said he and what does that
there differ from this only that that which has
caused that Darknets there is something greater
than a Cloak Quintilian observes that Pericles

freed the Athenians from a great Fear at that time

(b) An vero cum Pericles Athenienses Solis obscuratio-
nem territis reddidit eius rei causa metui liberavit aut
cum Sulpitius ille Gallus in exercitu L. Pauli de lune
defensione differret ne velut prodigio divinitus factis
militum animi terreterentur non videtur esse usus oratio-
nis officio? Valerius Maximus does not say as Plu-
tarch does that Pericles was upon the Fleet he
pretends that this Astronomical Precept was given in
the middle of death (c) Cum obscuratio repente sole
instituta perfusa tenebris Athenaei inlicitudine agerentur
intuitum sibi caelestis diuinationis portendi eadem res
Pericles processit in medium & quia a praecipitis suis
Anaxagora perimentia ad solis & lune cursum accipe-
re it differret nec ulterius crepidare cretus suos uno mo-
tu passus est brontinus mentions the Explication of
the Thunder bolt and not of an Eclipse Pericles
says he (d) cum in castra eius fulmen decussisset
terrissetque milites advocata concione lapidibus in
conspicuum omnium collatis ignem excussit sedantique
turbatione i cum decussisset similiter nubium attritu
ex uti fulmen

If all the Athenian Generals had had the Philoso-
pher Anaxagoras for their Master the Misfortune
which happen'd to the Athenian Fleet before Syra-
cusa had not happen'd It was ready to set sail in
order to return to Athens but the Moon being
Eclipsed the General Nicias put off the Departure
which occasion'd the Ruin of the Fleet Let us hear
Plutarch (e) The Moon fell Eclipsed in the
Night to the great Fright of Nicias and others
who for want of Experience or out of Supersti-
tion are fear'd with these Appearances That
the Sun would be darkened about the thirtieth
day of the Month by the Moon going between
this even the ordinary People now well enough
understood but the Moon itself to be dark need
how that could come about and how on the
sudden a broad fall of Night would lose all their
Light and these such Colours that was
not easy to be comprehended but they conclu-
ded it to be Ominous and a Sign from God of
heavy Calamities to ensue For he who the
first and the most plainly of any and with the
greatest Assurance committed to writing how
the Moon is enlightened and over shadowed was
Anaxagoras yet neither was he Ancient nor his
Notion much taken Notice of but was look'd upon
as Heterodox and kept secret passing only
amongst a few under some kind of Caution and
Confidence for they would not suffer Naturalists
and mathematicians to call it a sign that
is, such who dispute the above as lessening
the Divine Power by reducing Things from na-
tural senseless Causes, and a long Chain of Ne-
cessity, without any thing of Providence, or a
Free Agent Hence it was that Protagoras was ban-
ished and Anaxagoras cast in Prison, and Pericles
had very much to do to procure his Liberty
These Words of Plutarch may afford Matter enough
for several Reflections

(a) Plut
in vit
Pericl

(b) Quin-
tilian
Orat I 1
c 10 p.
m 55

(c) Val.
Max I 8
c 11 m 1
ext

(d) Front
Stratag
I 1 c 12

(e) Plut
in Anax.

This true that he was not free from the Satyrical (D) Railleries of the Conick Poets. He was defamed by them upon several Accounts, but especially by reason of his Love to *Aspasia*. His immoderate Love of Women was one of the Vices he was * most upbraided with. He bore patiently E) thole Railleries, and he might have

* *St the*
Rem 1

(r) *Plut*
ab sup p
151

(f) *Id ib*

(f) *Plato*
in Phædo
p m 137
A B

(a) *Cic in*
Bruto p
m 72 73

(c) *Plut*
in Pericle
p 153
154 160
165 176

(d) *The*
Lives of
the Greek
Poets p
m 90

(e) *Id p*
81 82

πασιον εν τω ορβη διαι κη διδωτας αβ αλ γως αν
παραδωκω παλιν εδη το δακρυον ενυμνον τε λογον μω
παραδωκω. *Εργον δ' εσο το πορτα ανδρες αργη*
Quoties itaque intelligebat eos quippiam intempestive
ferociterque canantes orationis acrimonia deturbabat
quoties ab re formidantes rursus ad fiduciam erigebat
Denique verbo quidem popularis status re autem ipsa
penes primum vium p inc pati erat. *Plutarch (r)*
has wonderfully paraphrased that passage of *Thucy*
dides to which he adds very much to the purpose
what *Plato* says concerning the force of Eloquence
he observes also that the poets laugh at the Re
publick for granting too much power to one Man
and that they exhorted *Percles* to promise upon his
Oath that he would not be a Tyrant. *Αυτὸν δ'*
επιμαρτυροῦν μὴ τυραννίσαντα δακρυοῖς τε ἀστυμαχίᾳ
πρὸς δυνάμειαν κη παρυσίας πλεαυτὸν ο σης
αὐτοῖσιν ο δ' Αἰλακιδῆς πρὸς δακρυοῖς αν
ου τ ε Αἰδωας ο πολων τ πόρ ε αὐτως τε τις το
λεως τὸ δ' αν τις δ' αὐτως αν δακρυα τ γε τα
πλ ε κορυμνη τα δ' αὐτα παλιν κρητιβαλλει σπον
δους δυνάμειαν κρητιβαλλει σπονδους δ' αν
δους δυνάμειαν κρητιβαλλει σπονδους δ' αν
δους δυνάμειαν κρητιβαλλει σπονδους δ' αν
opes *ε* intolerabiles libera civitati tui inmodum se u
surpatum abnuare. *Teleclides* per misse ei referat *A*
sthenieses unum tributa ipsaque adeo urbes has liget
illas solvere muros lapides nunc extru re nunc eodem
demoliri federa esse vires pacem opulentiam for
tunaque omnes (f)

I must not forget to observe that with the ex
traordinary force of his Geniu he made a very
good use of his hiholophical Knowledge the bet
ter to set off his Eloquence. The sublime Specu
lations and the hysical and Metaphysical Depths
wherewith *Anaxagoras* had imbibed his Mind would
have proved an obstacle to several others who had
been desirous of acquiring the glory of being Great
Orators. But as for him he found in them where
with to give a wonderful force to his Harangues
We learn this fine particularity of *Plato* his Ex
pressions are noble and will charm those who un
derstand Greek. (f) *Πλάτωνος οὐ μαχαλα τ ν τ*
χρῶν το ἀφ' οὗθεν το ἀδύνατον κρητιβαλλοῦντα οὐ ε
πλεαυτὸν ο δ' Αἰλακιδῆς πρὸς δακρυοῖς αν
ου τ ε Αἰδωας ο πολων τ πόρ ε αὐτως τε τις το
λεως τὸ δ' αν τις δ' αὐτως αν δακρυα τ γε τα
πλ ε κορυμνη τα δ' αὐτα παλιν κρητιβαλλει σπον
δους δυνάμειαν κρητιβαλλει σπονδους δ' αν
δους δυνάμειαν κρητιβαλλει σπονδους δ' αν
δους δυνάμειαν κρητιβαλλει σπονδους δ' αν
Magnæ qualiter arte exercitacione dialectice contem
plationeque sublimium in natura reum indigent. *Ipsa*
enim mentis sublimitas *ε* vi effeas in quavis re pe
ficienda hinc quodammodo proficisci videntur quod *Pe*
ricles ad ingenii acumen adiunxit *Anaxagoras* nimirum
huiusmodi rerum inda atorū familiaritate fretum con
templationi se tradidit mentisque *ε* dementia naturam
illam comprehendit de qua *Anaxagoras* diffusè differunt
Unde ad dicendi artem quod ipsi conducere videbatur
traxerunt *Cicero* who as I think had that passage
of *Plato* in his view does not expect all the sub
limity of it. *Perciles* says he (a) primis addidit
doctrinam quamquam vix nulla erat dicendi: tamen
ad *Anaxagora* physico rerum ad excitationem mentis a
reconditis abstrusissque verbis ut *Cicero* forenses popularē
que facile traxerant huius familiaritate. *Sc*
(D) From the Satyrical Railleries of the Conick
Poets. He was abused by *Cratinus* *Teleclides* *Eu*
polis. *Plato* the Conick Poet and *Dexippus* *Plu*
tarch does not only say so but even sets down (c)
their very Words. *Tanaquilus Faber* observes (d)
that *Cratinus* was resolute and bold in his Compositions
and that his Pen spared not the Principal Officers of
the Republick and the Great and Olympian Powers
Let us see what he says in another Place (e)
Hermippus said a thing which *St Augustin* was
doubtless ignorant of for that Great Doctor who
understood not Greek so well as some might think
and studied more carefully the Doctrine of *Grace*
than the Greek History or the Conick Poets, says
"somewhere in his Work *de Civitate Dei* that the
"Licentiousness of the Stage was never so impudent
"as to offend *Perciles* whereas *Terence* made no
"scruple to offend *Jupiter* himself (that Passage

is to be found in the *Eunuch*). He was therefore
mistaken for *Hermippus* made some Verses against
" *Perciles*. There was never a more unjust Censure
than this is. For *Augustin* does not say what the
Salurnian Critic imputes to him. That father has
quoted a long Passage wherein some Body deplores
the Cause of Great *Perciles* because he was not spar
ed by the Sage Poets. (f) *Quid autem hi (nferunt p m 150*
Romanorum Cicero t statu in l'ris qir d' Pe
publica (spit ubi Sc pio disputans ait Nunquid co
mard emil onductus ubi pat yem probate fust il s
ria flagitio pot isent Et Graci quidem intiquioris
viti s sua opinionis q andam oncentualium l'ris viciant
aid quos fust etiar lege nessim ut q d' llet comit
dia nominatim vel de quo vellet d e t Itiq e fust
in eisdem libris loquatur Atitius qm n' lla n' attit
git vel potius q em non vexavit cui pejeret Ello
p pulares homines in vepit fcti 100 Cleo
nei Cleghontem Hyperbolum lalt 1 et am inquit
etl h yimodi erue a se fore in l'ris est qiam a poet
notari sed Perclem cu jru il vult sti maxima
autorit ite plurimos annos domi qir bell p'fussit t
lari vel l'bus q' eo ay in scena n' plus d' cut quam
si Plautus inquit n' l'it voluisset aut Naxius l'ub io
q' Cneo Scipioni aut C' alius Mico Catoni maledice
ceie Deinde pulo p' l' m' l'ra inquit contradiote
cim tabula cim perpaucis re capite sanxisset in l'is
hanc quoque facientiam putaverit si quis adit v' l'it
f'ive carmen c' nadiq'is quod n' s'mia f'at ret f'ost
tumue l'to: Iracunde J'ulius enim ac M' i
stratus a' d' e' p' tationibus legitimi p' op'atam t' am
non p' tatum ingenis habere debemus nec probum ad
dire nisi ea l'ge ut r' spondere l' cat q' judi io def n
dere H' e' Cic' omis quarto de Repub l'ra libro ad
rbum excope d' v' l'it t'is sum non illis p' p' r' f'ia
cl'orem intellectum vel p' t'ermis f'it paululum com
mut it. All Authors ought to learn from this m
slake of Tanaquilus Faber to misfult their Memo
ry and never to alledge any thing without consulting
over aga in the Books wherein they remember they
have read it. He had read in St Augustin that the
Romans would not have permitted that their l'ayers
should offend Scipio tho they permitted that Te enc
should off nd Jupiter he misfult p' r' ood for Sci
pi and then he thought he had a good reason to
rail at St Augustin Let us see the Words of that
I'ather they are fine and judicious th v' l'it l'rad
the Romn l'egallit'is it' a very gr' e f'ult
they forbade the l'oers to abuse thair M' l'itrat'is and
permitted them to rid culle thair G' d () At
Romani si ut in illa de Repub d' p' ut it n' g' l' atur
Scipio probri q' in iur'is p' et r' am l'ubio q' v' l'it v' f' i
manq' h'ib re voluerit capite at n' p' n' e f' uentit
tale carin n' contere si qum ret Q' d' erg' se q' u
dem fatu honeste confisterunt se l' e' r' a Divs nos l'us
perbe q' r' religioze Q' o' em f' en non id n' p' t'is
ente sed etiam l'identor po t' r' am p' r' i' m' d' l' f' f' e
l'acerari se potius huiusmodi d' n' r' u' r' d' i' g' t' e' f' e' d' uce
v' i' n' t' seque ab e' etiam lege v' n' i' n' r' u' m' i' t' e' t' e' t' e
illa etiam f'ern l'olentat'is m' f' u' s' e' r' u' t' e' t' e' t' e' t' e
dem Scipio l'audat h'ic p' etu Romanis negat'is e' f' e
licentiam ut e' t' u' q' m' o' p' r' i' u' m' i' n' f' l' i' g' e' r' e' t' e' t' e
rum cum v' idet' eas n' l' l' D' r' am p' e' e' f' f' e' v' e' l' t' r' u' m
Itam pluris t'ibi habenda e' f' exultatio v' e' f' t' e' r' a
quam Capitolii imo Roma unius quam c' l' i' t' o' r' u' s
ut l' i' n' g' u' a' m' m' a' l' e' d' i' c' e' r' e' t' u' s' e' x' e' r' c' e' r' e' p' o' e' t' a' e' t' i' a
lege p' r' o' h' i' b' e' r' e' n' t' u' r' q' u' i' n' D' o' s' t' u' a' s' p' e' c' a' r' i' t' a' n' t' a
n' l' l' o' n' i' a' n' t' e' n' o' r' e' n' u' l' l' o' p' r' i' n' c' i' p' e' n' u' l' l' o' P' o' e' t' i' c' e
t' i' f' i' c' e' p' r' o' h' i' b' e' n' t' e' j' a' c' u' l' e' n' t' u' r' I' n' d' i' g' n' u' m' v' i' d' e' l' i' c' e' t' f' u' i' t
ut Plautus aut Naxius Publ o q' Cneo Scipi m' aut C' a
clitius M Catoni maledice et q' d' n' f' u' m' f' u' i' t
ut Te rentius v' e' f' t' e' r' f' l' a' g' i' t' i' o' v' o' u' m' o' p' t' i' m' i' a' d' o' l' e' s' c' e' n' t' i' u' m
negat'is comitaret Arn bus had already upbraid
ed the Heathens with the same thing See the
Margin (b) his Words go very well deserve to be
read

(E) He bore pat ently those Railleries. We don't
find that any of the Poets who abused him was
punished for it Yet it is very likely that a Man
of so great an Authority might have easily punish
vobis datum que quisque voluerit dicere turpitudinum iacere,
quas libido confinxerit atque excogitaverit formas. *Arms*
l 4 p 150, 151

DIPLOSPORA
singularis**The Ebony Woods**

664

Diospyros Toposia, Ham Fl Br Ind, III 556

Syn — *D. RACEMOSA* Roxb *Fl Ind Ed C B C* 414 *Wight Ic t* 416 *D. LANCEOLATA* Wall *Cat* 4122 *EMBRYOPTERIS LANCEOLATA* Don According to Brandis Gamble and other writers this is reduced to *D. MELANOXYLON* along with *D. TOMENTOSA* but by the *Flora of British India* all three are retained as separate species

Vern — Gālul SYLHET *Kaha kila* SING

References — Roxb, *Fl Ind Ed C B C* 414 Voigt *Hort Sub Cal* 345 Kurz *For Fl Burm II* 128 *Beddome Ic Pl Ind Or t* 122 & *For Man* 144 *Thwaites En Ceylon Pl* 170 *Trimen Sys Cat Ceylon Pl*, 52 *Indian Forester X* 34 *Royle Ill Him Bot* 262 *Balfour Cyclop* 954

Habitat — A large tree met with in Sylhet Cachar and Chittagong Roxburgh gives this the same vernacular names as recorded under his *D. ramiflora* and *D. lanceifolia*, and as these trees are all found in the same region it is probable the natives do not distinguish the one from the other

Food — FRUIT ripens in November and is eaten by the natives (*Roxburgh*)

FOOD
Fruit
665
666

D Tupru, Buch Ham Fl Br Ind III 563

Syn — *DIPSPYROS RUBIGINOSA* Roth ; *D. MELANOXYLON* Hiern in part

References — Brandis *For Fl* 205 *Bedd Fl Sylv t* 66 *Dalz & Gibs Bomb Fl* 142 *Bombay Gazetteer (Kanara) XV Pt I* 437

Habitat — A small tree of the Western Deccan Peninsula from the Concan to Mysore

667

D undulata, Wall Fl Br Ind III 568

Habitat — A large tree of Amherst Mergui and Malacca mistaken by some writers for *D. lucida* Wall a Singapore and Malacca species According to Kurz *D. undulata* occurs in the tropical forests of Martaban Tenasserim and the Andaman Islands It flowers in April and May and the fruit ripens in October to February

668

D variegata, Kurz Fl Br Ind III 557

Habitat — A large tree (attaining a height of 70 feet) found fairly abundantly in Assam Pegu and Martaban ascending to altitudes of 1 000 feet

Structure of the Wood — Sapwood white turning greyish heavy fibrous but close-grained soft (*Kurz*)

TIMBER
669

DIPLOSPORA, DC Gen Pl II 97

670

Diplospora apiocarpa, Dalz Fl Br Ind III 123 RUBIACEÆ

Vern — Panigara MAR ; Bachange KAN

References — *Beddome Fl Sylv t* 223 *Ic Pl Ind Or t* 40 ; *Dalz & Gibs Bomb Fl* 120 *Bomb Gas X / Pt I p* 68

Habitat — A small tree of the Western Peninsula from the Concan southwards ascending to 5 000 feet

Structure of the Wood — Used to make combs and toys (*Bomb Gas XV, I, 68*)

TIMBER,
671

672

D singularis, Korth Fl Br Ind, III, 123

Vern — Thittú BURM

Habitat — A small tree distributed from the Khásia hills to Pegu Tenasserim Amherst, Sumatra, Borneo &c.

D 672

The Garjan Oil Trees

(G Watt)

DIPTEROCARPUS
alatus

Structure of the Wood—Rough with numerous prominent medullary rays weight 36lb a cubic foot (*Kurz, Fl Brit Burm, II 50 Gamble, Man Timb 119*)

TIMBER
673

DILOTAXIS, DC Gen Pl, I, 84 967

Diploaxis Griffithii, H f & T Fl Br Ind, I 157 CRUCIFERÆ

674

Vern—*Singai, mole TRANS-INDUS; Barāni muli bībācha chinaka (Sind Sagar Doab) PB Parjan f MERWARA*

Habitat—A robust herb 1—3 feet high found on the Salt Range in the Panjāb and distributed thence through Baluchistan to Afghanistan Mr Duthie alludes to a species of *Diploaxis* as collected by him in Merwara and the vernacular name there given to it has provisionally been included with the above. If this prove correct the area of the species should be given from Merwara.

Food.—Eaten as a pot herb

FOOD
675

DIPTEROCARPUS, Gärtn f Gen Pl I 191 981

A genus of lofty trees embracing some 50 species natives of Tropical East Asia. Of these India (as accepted by the *Flora of British India*) possesses 17 of which 6 occur in India proper. The others are Ceylon species or appear in Burma and are distributed to Malacca. The generic name has been given in allusion to the winged condition of the fruit due to the accrescent calyx.

Dipterocarpus alatus, Roxb Fl Br Ind I 298; DIPTEROCARPEÆ

676

Syn—DIPTEROCARPUS COSTATUS Gärtn f

Vern—*Garjan (batti sal according to Balfour shweta garjan according to Birdwood) BENG Kanyinbyu (=white Kanyin) BURM Horagaha (according to Birdwood) SING*

References—*Roxb Fl Ind Fd C B C 439 Kurz For Fl Burm I 116 117 Gamble Man Timb 33 O'Shaughnessy Beng Dispens 224 Dymock Mat Med W Ind 2nd Ed 88 Year Book Pha m 1877 155 Birdwood Bomb Pr 257 Cooke Gums and Gum resins 114 Report on the Gums and Resins of India published by the P W D pp 19 20 31 35 37 & 62 Indian Forester I 365 VI, 125, VIII 416 Balfour Cyclop 956 Kew Off Guide to the Mus of Ec Bot 17*

Habitat.—A large tree met with in Chittagong Burma and the Andaman Islands distributed to Siam

Oleo-resin—Kurz says this tree yields a WOOD-OIL in great quantity and exudes a dirty brown resin. The oil and resinous thicker substance are at first mixed together, this mixture is strained through a cloth whereby the clear oil separates itself from the resinous portion. According to Roxburgh this species affords the wood oil of Pegu.

In a recent correspondence with Mr J W Oliver Forest Department Burma this species is given (along with *D laevis* and *D turbinatus*, &c) as one of the trees that yields the thin oil which in Burmese trade reports is designated *Kanyin-oil* or Burmese wood-oil. The thick oleo-resinous substance known in Burma as *in-oil* is obtained from *D tuberculatus*. It is probable that the latter substance is that which sometimes bears in India the name of Garjan oil but this point has not been satisfactorily determined and it seems likely that the Garjan oil of European and Indian commerce may in reality be any one or a mixture of all the *Kanyin* and *in* oils but chiefly of the former. For particulars as to the extraction of *Kanyin-oil* see a further page under *D turbinatus*.

OLEO RESIN
Wood-oil
677

D 677

DIPTEROCARPUS

lævis

The Garjan Oil Trees

- TIMBER**
678 **Structure of the Wood.**—Sapwood white heartwood reddish-grey moderately hard smooth mottled takes a fine polish Weight from 38 to 50 lb a cubic foot Used for house-building and canoes but is not durable if exposed to wet it decays rapidly the canoes made of it lasting only three to four years.
- 679 **Dipterocarpus angustifolius, W & A, Fl Br Ind I, 299**
 Syn.—DIPTEROCARPUS COSTATUS Roxb (not of Gärtn f)
 According to Roxburgh this species is a native of Chittagong By the *Flora of British India* it is viewed as doubtfully distinct.
- 680 **D Griffithii, Miq Fl Br Ind, I 299**
 Syn.—DIPTEROCARPUS GRANDIFLORUS Griff (not of Wall)
 References.—Kurz For Fl Burm I 116 Report on Gums and Resins issued by P W D pp 34 62 64
 Habitat.—A tree of the Mergui and South Andaman Islands Kurz says it is common in the tropical and moister upper mixed forests of the Andamans and also in Tenasserim
- TIMBER**
681 **Structure of the Wood.**—Yellowish grey rather coarsely fibrous close grained and heavy (Kurz)
- 682 **D. incanus, Roxb Fl Br Ind I, 298**
 References.—Roxb Fl Ind Ed CBC 439 O'Shaughnessy Beng Dispens 224 Dymock Mat Med W Ind and Ed 88 Report on Gums and Resins issued by the P W D pp 19, 20 31 35 37 Cooke Gums and Gum resins 114 Agri Hort Soc of India Journ Vol IV 15 Spons Encyclop 1651 Balfour Cyclop 956 1087
 Habitat.—A tree of Chittagong (Roxburgh) but according to Kurz it occurs also in Pegu
 Oleo resin.—It yields a WOOD OIL or balsam Roxburgh says this is the *garjun* tree of Chittagong where the tree grows to a great size and is said to furnish the largest proportion of the best sort of wood oil or balsam mentioned in my description of **D turbinatus** Flowering time November and December and the seed ripens in April Balfour seems to be mis taken when after enumerating **Dipterocarpus alatus** **D costatus** **D incanus** **D lævis** and **D turbinatus** as yielding wood oil he adds but **D incanus** is supposed to yield the best sort and in the greatest quantity
- OLEO-RESIN**
Wood oil
683 **Medicine.**—Dymock also includes this plant along with **D turbinatus** and **D alatus** in his account of the medicinal Gurjun oil but it is certainly far less important commercially than Kanyin oil yielding trees of Burma.
- MEDICINE**
Oil
684 **D indicus, Beddome, see under D lævis, Ham**
- 685 **D lævis, Ham, Indian Forester X, iii 131, IX, 216**
 The lofty tree so named—a native of the tropical forests of Burma—is, by the *Flora of British India* reduced to be a synonym for **D turbinatus** Gärtn f It has been the custom followed by the writer to accept the *Flora* as the standard on all botanical points the endeavour being made in the present work to compile the economic information regarding plants under the names as established by Sir J D Hooker Gamble Kurz and other Indian botanists do not however, accept the above reduction as correct but prefer to regard these names as belonging to distinct trees Should this latter opinion be confirmed the information given under **D turbinatus** would probably to some extent have to be rearranged Gamble however affirms that the Garjan-oil tree is **D turbinatus**, although under
- D 685**

The Male In or Inbo Tree. (G Watt) **DIPTEROCARPUS pilosus**

D laevis he makes the remark that it yields copiously a resin and a wood-oil used for painting. According to some of the more recent writers garjan and wood oil are distinct, though both are obtained from several trees. If this be so a rearrangement would probably not seriously affect what has been given below. It may serve a useful purpose therefore to mention in this place the Burmese name given to **D laevis**, *Ham vis*, *Kanyin ni* (e.g. red *Kanyin*) while **D alatus** is known as *Kanyin byu* (e.g. white *Kanyin*). Gamble points out that according to the *Flora of British India* **D indicus** Beddome t 94 may be reduced either to **D turbinatus** or **D laevis**. He appears however to view it as a distinct species a native of the western Ghâts which is there known as *Guga* and *Walwara* in Kânarese. The Garjan oil reported to be made in South India would accordingly be the produce of **D indicus**.

Resin—The authors who recognise this as a distinct species say that it yields a RESIN similar to that of all the other species.

Oil.—For information as to the wood oil obtained from this plant see under **D turbinatus**.

Structure of the Wood—Sapwood white heartwood rough reddish soft is rarely used but is occasionally employed for planking and rafters weight 43—49lb a cubic foot.

REISIN

686

OIL

687

TIMBER

688

Dipterocarpus obtusifolius, *Teysm Fl Br Ind, I* 295

This is in Burma called the male *In* tree or *Inbo*.

Vern—*Inbo kanyin kok* (according to Gamble) BURM

References—*Kurz For Fl Burm I* 115 *Gamble Man Timb 31 Indian Forester VIII* 416

Habitat—A large deciduous tree of the Eng (*In*) forests of Prome and Martaban ascending to 3 000 feet. It is commonly found forming small patches in the *In* forests.

Resin—This tree is said to afford a clear white or yellow resin not an oil. This is reported to burn readily but is not used for any purpose.

Structure of the Wood—Heartwood reddish brown rough moderate ly hard. Pores large and moderate-sized. Weight 59lb per cubic foot (*Gamble*). *Kurz* says it is of the quality of that of *Eng*.

RESIN

690

TIMBER

691

D pilosus, *Roxb ; Fl Br Ind, I*, 296

Vern—*Hollong* ASSAM

References—*Roxb Fl Ind Ed CBC* 440 *Kurz Fl Burm* 115 *Jour As Soc Bengal* 1870 II 65 also 1874 p 98 *Forest Fl Burm I* 115 *Gamble Man Timb* 31

Habitat—A large evergreen tree met with in Assam Chittagong Pegu Arracan hills of Martaban and Tenasserim and also the Andaman Islands. Distributed to Sumatra.

Oil-resin—Mr Oliver, in the report below and accompanying correspondence suggests that perhaps some of the *Kanyin* oil of Tenasserim may be obtained from this tree.

Structure of the Wood—Of a reddish brown colour, close and pretty straight grain it does not warp or split much but quickly deteriorates unless kept in a dry and ventilated place. It is attacked by nearly all the timber insects. Notwithstanding its large size it is of little or no use except for temporary purposes and for packing boxes it must, however be borne in mind that in Assam this latter use forms a very important business, as not less than 400 000 boxes for packing tea are used yearly the making of each one requiring about 1 50 cubic feet of rough timber (*Paganini in Indian Forester*).

689

692

OLEO-RESIN

693

TIMBER

694

Packing

boxes

695

**DIPTEROCARPUS
tuberculatus**

The Eng or In Tree

696

Dipterocarpus tuberculatus, Roxb Fl Br Ind, I, 297**THE ENG (or, as it is now spelt, In) TREE**

In a passage quoted below this is said to be known to the Burmans as the female *In* (or *Inma*) It is reported to yield a thick oleo-resinous substance

Syn — *D GRANDIFLORUS* Wall

Vern — *Eng* or *in* BURM *Soahm* TALEING

References — *Roxb Fl Ind Ed C B C 440; Brandis For Fl 27; Kurz, For Fl Burm I 113 Gamble Man Timb 32 Special Report by Mr Alpin Deputy Conservator Forests, Burma (Tour with Southern Shan Force 1887-88) Cooke Gums and Gum resins 115 Indian For ester I 107 362 363 II 178 181; VIII, 113 416; IX 14 X 131 134 XIII 56 Balfour Cyclop 957 Ind For X iii 131*

Habitat — A large deciduous, gregarious tree forming the *In* forests of Burma and Chittagong Distributed to Siam

Oleo-resin — According to Roxburgh Gamble Kurz and other authors this tree does not yield a wood oil but exudes a clear yellow resin Mr J W Oliver Deputy Conservator of Forests informs the writer however that it does yield an oil but an oil of a considerably thicker substance (an oleo-resin) than the kanyin oils described under *D. turbinatus*

In a further page under *D. turbinatus* will be found a general account of Gurjun and Wood oil The former appears to be the crude product the latter the liquid oil obtained after the subsidence of the heavy resinous matter This takes place on *Kanyin* and *In* oils being set aside for a few days Mr B Ribbentrop Inspector General of Forests on being asked as to the difference between *Kanyin* and *In* oils replied that there is no doubt the *In* tree affords an oleaginous substance but whether chemically different from *Kanyin* he was not prepared to say One point in favour of its being different consists in the fact that it flows freely from a wound and practically without requiring the aid of fire (the tree being rarely charred The *Kanyin* oils on the other hand are obtainable only after the cut surface of wood has been charred In both cases Mr Oliver believes however that the thick dry deposit that forms on the wood clogs the pores and prevents the escape of the oil and that this is fired in preference to being chipped off as a matter of convenience It burns readily and quickly thus exposing the pores whereas it would take some time to effect the same result by chipping or paring the surface Mr Oliver reports as follows: *In* oil — This is the produce of *D. tuberculatus* (Burmese *In* or *Inma* female *In* which is the most common species in Burma) and is always found on laterite gravel or clay very often forming pure forests The process of extraction practised in the Prome and Tharrawaddy districts is as follows — a deep semi-circular niche with a convex roof is made through the sap wood near the foot of the tree extending round one-third of its circumference with a hollow in the lower portion of the cut to receive the oil After a few days the oil is collected and the wood on the upper surface of the incision chipped away so as to expose a fresh surface of sap wood This chipping has frequently to be repeated as the pores of the wood become clogged with congealed oil In many cases fire is also applied to the cut but this appears to be not absolutely necessary The object of firing is probably the same as that of chipping *vis*, to remove the congealed oil The latter is very inflammable and the cut surface invariably gets burned during the jungle fires, whether fire is used in collection or not so that between chipping and burning a wound some 6 feet long by 2 feet wide is formed in the side of the tree The tree thus gets gradually cut or burned through and falls over by its own weight The oil is collected from four to ten times a month A man

OLEO-RESIN
697**D 697**

The Garjan or Kanyin Oil

(G Watt)

DIPTEROCARPUS
turbinatus.

and boy can look after 300 trees which yield about 20 viss a month. The time of collecting lasts from August to February. At the end of the season the congealed oil or resin which remains in the hollow is scraped off and used for TORCHES which are made of rotten wood mixed with oil and resin and rolled up in the leaves of the *sattliwa*—a species of screw pine common along the banks of streams in *In* forests. The oil is also largely used for water proofing bamboo-baskets for well buckets &c. The selling price of oil in the Prome and Tharrawaddy districts in 1882 was 5 to 7 viss for the rupee. In the *Indian Forester* (1875) Sir D. Brandis contributed a paper on the Black Burmese Varnish (obtained from *Melanorrhoea usitata*) in which he gives some particulars regarding *In* oil. He remarks that the oil exudes from the outer layers of wood. He describes the process thus—Deep semi-circular niches are cut into the wood; the first cut is about 4 to 6 inches deep and 12 to 18 inches wide; the bottom of the niche being slightly hollowed out to receive the oil. It oozes out and collects at the bottom of the niche about three days after the cut has been made. The surface is then charred with fire after which the oil runs for three days. This process is repeated four times and at the end of fifteen days the surface of the niche is cut afresh, the old charred wood being cut away and the niche enlarged. After the oil has run for three days the surface is again charred and the original process repeated. The *Eng* tree yields oil throughout the year and one tree often yields oil from several niches at the same time. I saw a tree with six niches* two of which were yielding oil at the same time. One man can make 2 000 to 3 000 torches in a year and 100 torches require about 10 viss (36lb) of oil which is mixed with touch wood and neatly wrapped up in the leaves of palms or of the *tsathoaben* a species of *Pandanus* so as to form cylinders about 20 inches long and 2 inches in diameter. They are tied with thin strips of bamboo generally *tinwa* (*Shuzostachyum pergracile*) elsewhere in the Hlaine district the leaves of the *Zalooben* (*Licuala peltata*) are used for this purpose. This is the information which was given me in the *Eng* forest of Tyemyouk and if it is correct a man can collect about 700 to 1 000lb of wood oil in a year. These torches are sold at Rs 3 8 or Rs 4 a 100 near the forests. The wood oil of the *Kanyin* tree is collected precisely in the same manner.

Medicine.—Mason says that the oleo-resin of this tree is used with asafetida and cocoa nut oil as an application for large ulcers.

Structure of the Wood.—Brown with darker coloured heart wood rather heavy and loose-grained sometimes used for canoes but more generally for planking.

Dipterocarpus turbinatus, Gaertn f., Fl. Br. Ind. I, 295**KANYIN OIL**

Syn.—*D. lævis* Ham. as established by the *Flora of British India*.

The term **WOOD OIL** given sometimes to the oleo-resin obtained from this plant should be distinguished from the fatty oil (also called **WOOD OIL**) which is obtained from *Aleurites*, see Vol. I, No. 740.

Vern.—*Garjan thya gurjun* BENG. *Kanyoung* MAGH. *Gurjun* GUZ. *Challans* KAN. *Kanyin ni* (if *D. lævis* be distinct from this species they would appear to both bear the same vernacular names) BURM. Mason says the Burmese distinguish two forms of this plant—*Kanyin* (ni) red and *Kanyin* (phu) white but the latter according to modern writers is *D. alatus*.

May this not rather have been a *Ka yin* than an *I* tree. The process here described appears to be that given by Mr. Oliver for *Kanyin*.

M

D 701

TORCHES
698MEDICINE
699
TIMBER
700

701

DIPTEROCARPUS
turbinatus**The Garjan or Kanyin Oil.**

References—*Roxb Fl Ind Ed C B C 439 Kura For Fl Burm I 114 115 Gamble Man Timb 31 32 Mason's Burm & Its People pp 493 516 527 757 Hooker Him Jour, II 348 Report & Gazetteer of Burma by Major Douglas Macneil (prepared for Q M G & Dept) Vol II 228 O Shaughnessy Beng Dispens 12 222 Dymock Mal Med W Ind 2nd Ed 88 Flück & Hanb Pharmacog 88 U S Dispens 15th Ed 1779 Extra Pharm by Martindale & Westcott p 92 Year Book Pharm 1875 503 Royle Prod Res of India 77 Birdwood Bomb Pr 11 257 Cooke Gums and Gum-resins 113 Report on Gums issued by the P W D pp 19 41 Spens Encyclop 1651 Balfour Cyclop 957, 1087 Home Dept Cor 225 230 232 290 Trans Agri Hort Soc VIII 345 Jour Agri Hort Soc Vol IV 14*

Habitat—An evergreen tree of Eastern Bengal Chittagong Burma and (according to Gamble) of the Andaman Islands Distributed to Singapore

It is said to be one of the loftiest of Indian trees individual specimens being sometimes seen 250 feet in height but *D laevis* is generally reported to be the higher form *D turbinatus* rarely exceeding 200 feet Hooker referring to *D turbinatus* in his account of Chittagong says

This is the most superb tree we met with in the Indian forests we saw several species but this is the only common one here it is conspicuous for its gigantic size and for the straightness and graceful form of its tall unbranched pale grey trunk and small symmetrical crown many individuals were upwards of 200 feet high and 15 in girth

OLEO RESIN

Oleo-resin—Considerable confusion exists in the literature of Garjan and Wood-oil Apparently several species of *Dipterocarpus* yield balsamic products to which it would seem the name *garjan* oil is assigned In Burma one set of oils is however collectively spoken of as *Kanyin*-oils another as *In*-oils The term *garjan* appears to be unknown to the Burmans

A reference having been made by the Revenue and Agricultural Department to the Government of Burma for particulars to be inserted in the present publication as to the various species of *Dipterocarpus* that yield wood oil (*garjan*) the following instructive reply was obtained The passage here quoted is in continuation of that given above under *D tuberculatus*—*Kanyin* oil is the produce of *D laevis* (*Kanyin in* = Red *Kanyin*) and *D alatus* (*Kanyin byu*=White *Kanyin*) which are common in evergreen forests and probably of other species of similar habitat The oil is generally collected only in the dry weather (November to May) It is obtained by cutting two or three deep pyramidal hollows (the apex pointing towards the interior of the stem) near the foot of the tree and by applying fire to the upper cut surfaces The oil then collects at the bottom of the hollow which is emptied every three or four days Fire is applied every time the oil is removed and the upper surfaces of the hollow are rechopped three or four times during the season In Tharrawaddy district where trees are not very plentiful twenty are about as many as one man can attend to The yield of twenty trees would be about 100 viss for the season worth Rs25 In Prome district oil only comes into the market in the form of torches which are made of rotten wood steeped in oil and rolled up in *Salu* leaves (*Licuala peltata*) The exports of *Kanyin* oil from Burma ports during 1887 88 were as follows—

		R
Rangoon	18 826 gallons valued	16 302
Moulmein	782	575
Mergui	55 470 viss	9,394

D 703

PROCESS OF
EXTRACTION
702

IN BURMA
703

The Garjan or Kanyin Oil (G Watt)

DIPTEROCARPUS
turbinatus

The exports of torches were —

Tavy 2 000 valued at
Mergui 850 225 „

R
30
22 372

PROCESS OF
EXTRACTION

Collectors do not keep the oil from the different kinds of Kanyin trees separate consequently the oil that comes into the market is the produce of different species mixed in varying proportions The Mergui Kanyin tree seldom exceeds 6 feet in girth and is probably distinct from the species found in Pegu and North Tenasserim which commonly attain a girth of from 15 to 25 feet

Two other communications procured through the circular letter alluded to above may be here published The Conservator of Forests in Bengal reported *Dipterocarpus turbinatus* the *Teli gurun* of Bengali is found in the Chittagong District It is prohibited to tap in the Collectorate owing to the large number of trees already killed by tapping This prohibition does not extend to the hill tracts As much of the oil exported from the hill tracts is shoulder borne the total amount exported cannot be definitely stated But the total amount carried past the revenue stations and which paid a royalty of 10 per cent *ad valorem* in 1883 84 to 1887 88 may be said to have been as follows 1883 84 355 maunds 1884 85 125 maunds 1885 86 96 maunds, 1886-87 60 maunds and 1887 88 51 maunds

The mode of tapping is to cut a deep hollow in the tree and keep live charcoal in it at night The oil is removed in the morning and fresh live charcoal put in again at night It is repeated till the oil ceases to flow Three four or more such deep hollows are often cut in the same tree, with the not surprising result that the tree is killed The falling off in exports is most probably due to most of the trees having been already killed by the tapping A sketch was furnished along with the above report in which the notch made in the trees was shewn to be the same as that described in Burma by the above passage In this way a cavity is formed with a flat bottom on which it would be possible to deposit live charcoal but it may here be added that in Burma charcoal does not appear to be used

The other communication was from the Conservator of Forests Coorg which gives an account therefore of the wood-oil prepared in that portion of the west coast of Southern India (*Conf* with remarks under *D laevis* regarding *D indicus*) The Conservator writes We have two oil trees in the Western Ghat Forests of Coorg Both I believe are species of *Dipterocarpus* but have not been able to get the flowers to identify them The oil is contained in the pores of the wood and is collected by cutting a hole into the centre of the tree One species yields a yellow oil and the other a dark red The former is sold in the bazaars mixed with dammar (the produce of *Vateria indica*) as varnish at 5 annas a bottle The latter also makes a fair varnish It has a strong cupaiba like smell and would probably be useful in medicine

During a conversation on this subject with the writer Mr Ribbentrop remarked that it was impossible to mistake the trees that yield *Kanyin* and *In* oils *D tuberculatus* the *In* was a low growing tree found only on the *indang* soils and forming dense forests somewhat like its associate the *säl* (*Shorea obtusa*) This was in his opinion the chief if not sole source of the oil which was collected in the autumn and cold season flowing from a wound *without the aid of fire* The other trees alluded to were *D turbinatus*, *D laevis*, and *D alatus* These are very lofty occur in mixed forests and tower above the surrounding trees They frequent deep rich soils and yield in spring their oleaginous products on being charred Mr Ribbentrop regards *D laevis* as distinct from *D turbinatus*

IN
CHITTAGONG.
704

IN COORG.
705

Varnish.
706

DIPTEROCARPUS
turbinatus
The Garjan or Kanyin Oil
VARIETIES
707

tus the former being a much loftier tree than the latter **Kurz** mainly distinguishes these plants by the former being glabrous while the latter is hairy

Varieties of Garjan Oil—The writer can discover no author who has separately distinguished the oleo-resins described above indeed in all the published accounts which he has been able to consult the substance described appears to be that obtained after charring the trees—the Kanyin oils Thus **Roxburgh** wrote of **D turbinatus** that To procure the balsam a large notch is cut into the trunk of the tree near the earth (say about thirty inches from the ground) where a fire is kept up until the wound is charred soon after which the liquid begins to ooze out A small gutter is cut in the wood to conduct the liquid into a vessel placed to receive it The average produce of the best trees during the season is said to be some times forty gallons It is found necessary every three or four weeks to cut off the old charred surface and burn it afresh in large healthy trees abounding in balsam they even cut a second notch in some other part of the tree and char it as the first These operations are performed during the months of November December January and February Should any of the trees appear sickly the following season one or two more years respite is given them **Lieut Hawkes** published in his report on the Oils shown at the Madras Exhibition of 1855 an account of the extraction of this oil by charring the operation being performed in

March or April But **Lieut Hawkes** was apparently like **Roxburgh** ignorant of the oil extracted from **D tuberculatus** with or without the aid of fire **Sir J D Hooker** (*Him Journals Vol II 348*) gives a brief note regarding the oleo resin obtained in Chittagong from **D turbinatus** He says A fragrant oil exudes from the trunk which is extremely valuable as pitch and varnish &c besides being a good medicine The natives procure it by cutting transverse holes in the trunk pointing downwards and lighting fires in them which causes the oil to flow **Mason** than whom few more trustworthy authors on Burmese subjects could be found attributes wood oil to **D laevis** and **D turbinatus**, but says of **D grandiflora** (a synonym for **D tuberculatus**) that the gum of this species as well as that of the preceding is used by the natives to make torches It is however significant that **Mason** should not have described the process of extraction of his wood oil or of the gum nor even mentioned the seasons at which these products are obtained **Dr Cooke** in his report on the Gums Resins and Oleo resins of India quotes **Roxburgh's** description of the process of extraction and reviews the opinions advanced by **Lieut Hawkes** under **D turbinatus Gartin f** but under **D tuberculatus, Roxb** he simply remarks A wood oil under the name of *Eng* is said to be the produce of **D tuberculatus** this was sent to London from Burma (May 1874) for valuation and report **Flückiger** and **Hanbury** (in their *Pharmacographia*) follow the same course but seem not to have heard of an oil extracted without the aid of fire such as the thick oleo resin known in Burma as *In* oil

In a further paragraph will be found the opinions of medical writers regarding Garjan oil in which it is held that there are different qualities some of very considerably higher medicinal merit than others This fact would point to the desirability of a thorough investigation into the oleo resins obtained from all the species of **Dipterocarpus** in which the chemical properties and industrial merits of each should be separately established With this in view experiments might be conducted in order to ascertain if **D tuberculatus** is the only species that affords the oil on being simply tapped or whether **D turbinatus** and **D laevis** might not also do so and lastly what action or influence the charring process exercises It

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(G Watt)

DIPTEROCARPU
turbinatus

VARIETIES.

seems probable that assuming that the oleo-resins from all the species of *Dipterocarpus* are chemically identical that obtained during a different season of the year and by a different process may be distinct or have its properties changed from what might be called the normal secretion of the *Dipterocarpus*. In concluding this brief review of the literature of *garjan* oil it may be as well to point out that according to the report above the *Kanyin* oil (or that produced by charring the trees) comes into the market mainly as torches. From this fact the inference might be deduced that the *garjan* oil of commerce was obtained from *D. tuberculatus* and not from *D. turbinatus* and *D. laevis* the species to which the oil has hitherto been attributed. The writer must however suggest caution in accepting this inference but it may safely be assumed that at least the thick honey like form of *garjan* oil is the *In* oil of Burma.

CHEMICAL PROPERTIES OF GARJAN OR WOOD-OIL—Lieut Hawkes (in his report on the Oils shown at the Madras Exhibition) says that this class of substances called wood oils forms the connecting link between the oils and resins of the vegetable kingdom. They consist of a volatile oil holding in solution a resin and are generally classed under the head of balsams. It is commonly stated that the oil if set aside for a time subsides into two substances *vis* a clear thin liquid floating above a thick mass known as *guad*. One of the most remarkable properties attributed to this oil is the fact that it is reported to act as a solvent to caoutchouc. This was apparently discovered at the beginning of the present century by Mr Laidlay and his experiments will be found in the *Transactions of the Agri Horticultural Society of India* (Vol VIII 345) also reproduced in *Mason's Burma*. Mr Laidlay directs that the caoutchouc should be dropped into the *garjan* oil in small pieces. In a few hours it swells and must then be frequently stirred to facilitate the process. If heat be applied complete solution is speedily effected. The solution obtained may be spread on cloth which is said to be thus rendered water proof. This fact appears to have been practically lost sight of while it might prove the key to an industrial utilisation of the substance since such water proofings would from the property of the *garjan* oil be at least proof against the attacks of insects if they were not found in addition to possess other useful properties.

A sample of *garjan* oil obtained from Moulmein was examined by Flückiger and Hanbury. Space cannot be here afforded to reproduce their report on the substance. The reader is referred to their *Pharmacographia* p 88 or to *Dr Dymock's Materia Medica of Western India* where however the account of the chemistry of this substance as given by the authors of the *Pharmacographia* is reproduced. By simple distillation with water they obtained 37 per cent of an essential oil leaving in the still a dark viscid liquid resin. The sp gr of this essential oil was found by Flückiger and Hanbury to be 0.915, but by O'Shaughnessy it is given as 0.931 and by De Vry as 0.928. One of the most remarkable physical properties of this oil is the fact that at a temperature of 130 C it becomes gelatinous and on cooling does not recover its fluidity. The learned authors of the *Pharmacographia* found the resin to contain like that of copaiba a small proportion of a crystallisable acid which may be removed by warming it with ammonia in weak alcohol. The portion of the resin which they found to be insoluble even in absolute alcohol was uncrystallisable. Werner however found a sample of *garjan* oil examined by him (as well as its resin) to be entirely soluble in boiling potash lye. The crystallisable acid extracted from the resin Werner called Gurjanic ($C_{44}H_{88}O_8$) it is soluble in alcohol 0.838 but not in weaker. It is dissolved also by ether benzol, or sulphide of carbon.

CHEMISTRY
708

**DIPTEROCARPUS
turbinatus****The Garjan or Kanyin Oil****CHEMISTRY**

The amorphous resin which forms the chief bulk of the substance obtained after the removal of the essential oil has not as yet been definitely analysed Flückiger and Hanbury found however that after complete desiccation it was not soluble in absolute alcohol These authors add that a sample of *garjan* balsam of unknown origin yielded a crystallisable substance answering to $C_{28}H_{46}O_2$ and this was devoid of acid character They would thus appear to have inferred that the *garjan* oil of commerce is not a substance of uniform chemical character hence they conclude by recommending that a comparative examination of the product of each of the above named species of *Dipterocarpus* would be highly desirable Dr Dymock while not materially enriching the chemical knowledge of this substance gives much interesting information as to the medical opinion held regarding the properties of the drug The admission of different chemical and medicinal results confirms to a large extent the contention advanced in this work *vis* that there are at least two widely different substances sold in the markets of India under the name of Garjan oil the Kanyin and In Oils of Burma

**TRADE
709**

TRADE IN GARJAN OR WOOD OIL—The above special reports regarding the *garjan* oil of Burma and Chittagong make the usual admission that owing to the cheap price of kerosine the trade in wood oil has very considerably declined It is now mainly used for torches and in water proofing &c The trade in the medicinal *garjan* oil must be very limited indeed It appears to be mainly obtained from the Andaman Islands and to be the produce of *D alatus* and possibly *D turbinatus*

Flückiger and Hanbury (l c) state that the world's supply is obtained from Singapore Moulmein Akyab and the Malayan Peninsula and is a common article of trade in Siam' (*Conf* with Mr Oliver's opinion above as to the plant which yields the Tenasserim oil) It is likewise produced in Canara in South India (*Conf* with remarks regarding *D indicus*)

It is occasionally shipped to Europe' The Burma oil is most probably obtained from *D turbinatus* and *D alatus* (*Kanyin*) and from *D tuberculatus* (*In*) Dr Dymock remarks Garjan Balsam is not an article of commerce in Bombay small quantities may be sometimes obtained in the native drug shops The Government supplies have been obtained from the Andaman Islands Dr Moodeen Sheriff (in his new work on the Materia Medica of South India of which proofs have been kindly furnished to the author) writes that in Madras wood oil is pretty common in most large bazars He describes several forms and gives their prices — Of the black or dark brown variety—wholesale R12 per maund retail or bazar annas 10 per pound Of the red or reddish brown variety—wholesale R24 per maund retail or bazar R14 per pound Of the pale white or grey variety—wholesale R18 per maund retail or bazar R1 per pound He adds There are several varieties of *garjan* or wood oil but out of these three are generally met with in the bazars which are known as *Sufid Garjan ka tél* or *Sufed Lakri ka tél* (the pale white or grey variety) *Lál Garjan ka tél* or *Lal Lakri ka tél* (the red or reddish brown variety) and *Kála Garjan ka tél* or *Kala Lakri ka tél* (the black or dark brown variety)

Fully fifty years ago hopes were entertained that *garjan* oil would become an article of European trade meeting a demand in the arts Dr Royle wrote on this subject and a member of the Agri Horticultural Society of India consigned five hundred gallons to London The effort proved futile as Dr Royle reports because the Custom house officers refused to pass it except at the highest rate of duty namely that for a manufactured article It seems probable that this obstruction prevented the industrial enterprise of the British manufacturer from being able to discover a use

D 713

Garjan
Balsam
710

Black
Variety
711
Red variety
712
Grey variety
713

**The Garjan or Kanyin Oil (G Watt) DIPTEROCARPUS
turbinatus**

for an article which has in consequence remained at a nominal value (Conf with p 164.)

MEDICINE

Garjan balsam does not appear to have been used medicinally by the early Hindus. It does not bear any Sanskrit Arabic or Persian names. In Muhammadan works on *Materia Medica* it is first mentioned in the *Makhsan* under the name of *Duhn el Garjan*. Ainslie was the earliest European medical writer to mention it and that in his *Materia Medica of Hindustan*—a work published in 1813. A prior notice occurs however in a work by Franklin (*Tracts on the Dominions of Ava* p 26) published in 1811. But Ainslie does not seem to have continued to value the drug since in his larger and final work—the *Materia Indica*—published in 1826 he makes no mention of it. Sir William O. Shaughnessy in 1841 (*Bengal Dispensatory* 222) recommended the balsam to the consideration of European physicians. He wrote: 'The *garjan* balsam varies in consistence from that of a thick honey to a light oily liquid. The colour of a fine specimen of thick *garjan* obtained from Captain Jenkins of Assam was pale grey; specimens sent from Rangoon by Mr Speir were a light brown. As found in the bazar this substance generally occurs as a brown oily looking semi-transparent liquid in odour strongly resembling a mixture of balsam of copaiba with a small portion of naphtha. After giving the results of his chemical examination or division of the substance into its essential oil and resin he continues: 'The close resemblance in the chemical properties of this *garjan* and copaiba balsam led to the institution of an extensive set of experiments on the medicinal effects of the former in the treatment of gonorrhœa. The results which have been laid before the profession and which have been confirmed by trials made by other practitioners seem perfectly conclusive that in the treatment of gonorrhœa, gleet and similar affections of the urinary organs the essential oil of *garjan* is nearly equal in efficacy to the South American drug. The essential oil may be given in 10 to 30 drop doses in mucilage, milk, rice water or thin gruel and repeated thrice or still more frequently daily. It generally causes a sensation of warmth at the epigastrium, eructations and sometimes slight purging. It communicates a strong smell of turpentine to the urine which it increases remarkably in quantity. Some obstinate cases of chronic gonorrhœa and gleet which had long resisted copaiba and cubebs have been cured by this remedy in the course of the experiments alluded to.' For additional suggestions relative to the mode of administering this remedy see *Copaiba*. In the *Pharmacopœia* we have given a formula for a solution of the essential oils of *garjan* and cubebs in sulphuric ether which affords a cheap but perfectly efficacious substitute for the celebrated Frank's Specific.

Pursuing in order of publication the Indian works which treat of this substance, the *Pharmacopœia of India* in 1868 made it official. It is in that work described as a stimulant of mucous surfaces particularly that of the genito-urinary system, diuretic and in a further page the results of various experiments with this substitute for copaiba are given. Dr T. B. Henderson of Glasgow is said to have used it only when copaiba failed and with remarkably good results. Dr H. B. Montgomery found that it is apt to produce an eruption of a character similar to that occasionally following the use of copaiba. Dr Kanny Lal Dey OIE (*Indigenous Drugs of India* p 51) republishes the facts given above regarding the use of the drug in the treatment of gonorrhœa but adds that it is also used externally as a stimulating application to indolent ulcers. Waring (*Basar Medicines*, p 56) says it has the odour

**MEDICINE
Balsam
714**

**OIL
715**

**DIPTEROCARPUS
turbinatus****The Garjan or Kanyin Oil****MEDICINE**Use in
Leprosy
716

and taste of copaiba, but is less powerful ' It has been used as a substitute for this latter drug in the treatment of *gonorrhœa* and trials with it in the hands of Europeans have shown that it is a remedy of no mean value in that affection. It is only advisable in the advanced stages or when the disease has degenerated into gleet. In the latter affection it is stated to prove most useful. It is also well worthy of a trial in *leucorrhœa* and other *vaginal discharges* ' Dr Waring then proceeds to say that great success has been found to attend its employment both internally and externally in the treatment of *leprosy*. He then quotes Dr J Dougall's proposed treatment for leprosy (*Indian Medical Gazette February and March 2nd 1874*) as follows. Rise at day light and wash the body thoroughly using dry earth as a detergent in which character it is more efficient than soap or bran. After this is completed at 7 A M a dose of the emulsion is given and for the next two hours the patient himself should perseveringly rub in the ointment over his whole body. This is a point of importance not merely smearing it in here and there but using thorough and continuous friction over the whole surface for a couple of hours. This prolonged rubbing is not only insisted upon for the sake of the action of the ointment upon the skin but because it is considered that any gentle employment combined with exercise proves beneficial both physically and mentally. After this inunction breakfast may be taken and some light employment followed during the day. At 3 P M a second dose of the emulsion is given followed by another two hours friction. Should the emulsion act too freely on the bowels the dose should be diminished. In none of the cases treated by Dr Dougall was there any change from the ordinary native diet but we may reasonably expect even better results where a liberal supply of good and nourishing food is allowed. The success which has attended this treatment is very marked and encouraging and is fully confirmed by Dr A S Lethbridge' (*Indian Medical Gazette 1st July 1874*)

On the other hand Dr Dymock says of Dr Dougall's reported success in the treatment of leprosy — In order to test the correctness of this statement large quantities of the Balsam have been distributed by the Indian Government but as far as I have heard the new treatment is not likely to prove successful. Dr Dougall's directions for carrying out the treatment of leprosy by *Garjan* Balsam include frequent ablutions with dry earth and water and strict attention to the hygienic condition of the patient. It seems probable that he has attributed effects to the balsam which are in reality due to cleanliness and an improved hygienic condition. Within the last two years several tons of the drug have been distributed in the Bombay Presidency.

Dr Moodeen Sheriff the most recent writer on the subject of the properties of *Garjan* Balsam says. All the varieties of *Garjan* oil are equally useful as a local stimulant but the red or reddish brown and the pale-white or grey varieties are the best for internal use. The best medicinal properties of this oil are its usefulness in *gonorrhœa* and gleet and in all forms of *psoriasis* including *lepra vulgaris*. In *gonorrhœa* and gleet it is at least equal to *copaiba* and the only difference between these two drugs is that the former requires to be used in a much larger dose (2 drachms to 3 drachms) to produce the same effect as the latter. As *Garjan* balsam is always used in the shape of emulsion with mucilage the largeness of its dose is no disadvantage. With regard to its usefulness in *psoriasis* and *lepra vulgaris* I am not aware of any other local stimulant which is more efficacious in those diseases than this drug. I have either cured or relieved many cases of the above affections by the use of this drug with little or no assistance of internal remedies. The internal use of wood-oil is also

The Garjan or Kanyin Oil (G Watt)

DIPTEROCARPUS
turbatus

MEDICINE.

attended with benefit in some cases of true leprosy in its early stage; but its efficacy in this respect is greatly enhanced with the addition of from five to ten drops of *Chaulmugra* oil to each drachm of it. If well mixed in the above proportions the combination of *Chaulmugra* oil cannot be detected. Some years ago I had received a bottle of *Gurjun* oil of this kind from a medical friend which proved itself more useful in a case of true leprosy than all its varieties in the bazaar but I did not know the existence of *Chaulmugra* oil in it until I was informed of it. Martindale and Westcott say 'It is very florescent has an opaque dingy greenish grey colour seen by reflected light yet is transparent and reddish brown in strong day light, it has the weak aromatic odour and bitterish aromatic taste of copaiba without the acidity—has been used as an adulterant of copaiba. It is not completely soluble in either ether or alcohol emulsified with mucilage of *Acacia* it is used with success like copaiba for gonorrhœa and in the East, as a remedy for leprosy an emulsion is made of equal parts of the balsam and lime water which is used freely as a liniment and given to the extent of 4 drachms three times daily.

SPECIAL OPINIONS COMMUNICATED FOR THIS WORK—§ 'Used in leprosy (Surgeon Major F B Thomas Waltan Visagapatam) Very effectual in relieving true leprosy. Dose internally as in the *Pharm Ind* for an ointment take of the oil 1 lime water 3 parts useful for chronic skin diseases and true leprosy (Thomas Ward Apothecary Madan apalle Cuddapah) Gurjun oil is of undoubted efficacy in tuberculous leprosy (Civil Surgeon R D Murray M B Burdwan) Used also in leprosy (G A Watson Allahabad) Very useful in cases of leprosy. Externally the oil should be well rubbed into the affected parts. Internally it is taken in doses of 3 drachms or 1 drachm mixed with lime water or Liqr Potassæ' (Civil Surgeon J Anderson M B Bynor).

In leprosy it was found beneficial. It was given internally and rubbed externally in the form of an emulsion with lime water (Surgeon T N Ghose Meerut). Is very useful in leprosy used both externally and internally. A case of elephantiasis now under observation is being treated with gurjun oil. It appears to be useful though the case is too recent for any certainty (Surgeon Major E Sanders Chittagong). I have tried it frequently in cases of leprosy it is a good dressing and heals the ulcers as well if not better than any other application and the inunction of the oil does the sufferer good constitutionally but it is certainly not a specific for leprosy nor does it stop the nerve disease (Surgeon Major C W Calthrop M D 4th Bengal Cavalry Morar). The oil with a little corrosive sublimate and sulphur is a capital remedy for ringworm (Surgeon Major P N Mookerji Cuttack Orissa). I used this oil for two years in the treatment of leprosy but found it perfectly useless (Brigade Surgeon C Foyut M D F K Q C P Poona). Gurjun tel—The Andaman oil is the best and useful in leprosy. I taken internally and applied externally too (Civil Surgeon C M Russell M D Sarun).

Is a good dispensary substitute for copaiba in gonorrhœa and mucous discharges. Its internal and outward use in leprosy is highly recommended (Dr Picachy Civil Medical Officer Purneah). I experimented for two years with gurjun oil as a cure for leprosy in the lepra ward at Burdwan in 1875-76-77. It is useless as a specific which it was claimed to be but the ointment is a fairly good application for leprosy and other ulcers (Civil Surgeon C H Foubert M B Darjeeling Bengal). The balsamic exudation of *D turbatus* or Gurjun balsam is a very valuable external and internal stimulant. It exercises more or less beneficial influence over all skin diseases but its curative effect in those of a scaly nature as lepra vulgaris and psoriasis is highly satisfactory. Many a case of the

**DIPTEROCARPUS
turbinatus****The Garjan or Kanyin Oil****MEDICINE**

last named disease has been relieved by its external use with little or no assistance of internal remedies I have also employed it pretty extensively in the cure of gonorrhoea and quite agree with what is already mentioned on this point There are several varieties of gurgun balsam but the thin and reddish brown variety is about the best (*Honorary Surgeon Moodeen Sheriff Khan Bahadur Triplicane Madras*) Useful application in scabies It did not prove so useful in my hands in gonorrhoea when administered alone Combined with liqr pot and other medicines in dram doses it has been found to be efficacious in certain cases (*Assistant Surgeon Shib Chundra Bhattacharya Chanda Central Provinces*) Recently much praised as a cure for leprosy I have not been able to obtain any remarkable effects from its use (*Civil Surgeon G Price Shahabad*) The oil prepared into an ointment for external application and given internally in leprosy in early stage of the disease undoubtedly arrests further progress and affords great relief in advanced cases The ointment is prepared by mixing the oil with lime water in equal parts and churning it into a creamy substance It should be well rubbed into the affected parts for at least 15 minutes every morning and evening The oil given internally from one to ten drops morning and night in cold water (*Civil Surgeon S M Shircore Moorshedabad*) It is a stimulant diuretic used in gonorrhoea and discharges from the genito urinary organs also in leprosy both internally and externally with lime water (*Bolly Chand Sen Teacher of Medicine*) Gurgun oil was used extensively at the penal settlement of the Andamans in the treatment of leprosy After long trial it was found to act beneficially in many cases as a palliative remedy but as a specific for the cure of leprosy it completely failed (*James Reid Principal Medical Store keeper to Government Fort William*) Has been used both internally and externally in leprosy with apparent benefit (*Civil Surgeon J H Thornton BA MB Monghyr*) It is a very good application for various kinds of skin diseases (*Doyal Chunder Shome*)

**TIMBER
717**

Structure of the Wood—Rough moderately hard heartwood reddish grey It is used for house building and for canoes in Burma The best Burmese charcoal is made from this and *D laevis* (*Gamble*)

Heavy rather close grained the sapwood pale brown narrow the heart wood darker brown takes a fine polish (*Kurz*)

DOMESTIC AND INDUSTRIAL USES OF GARJAN OIL**PROPERTIES
AND USES**

It is extensively employed by the Burmans as torches but now a days to a limited extent only is it used as a lamp oil It is largely employed in preserving bamboo wicker-work from the attacks of insects and in paving the bottoms of boats It is also used as a varnish It is reported to be useful as an ingredient in lithographic ink In European medicine it is mainly utilised as an adulterant for Copaiba But it is commonly held that if a process could be discovered of causing it to dry more rapidly it would come largely into European use as a varnish It has been suggested that this might be effected by mixing it with some good drying oil or by evaporating away the essential oil It seems to the writer however that a far more important way of utilising the article might be found in taking advantage of Mr Laidlay's discovery that it acts as a solvent to caout chouc A thick coating of India rubber is of course perfectly water-proof but the way in which India rubber sheetings over-coats &c harden dry and crack at one season of the year or stick together at another under the tropical climate of India would recommend the experiment being made to ascertain if this would be also the case with a water-proofing

**Varnish
718****Water
proofing
719****D 719**

Divi divi, *Cydonia Dodder* (G Watt)**DODECADENIA**
grandiflora

material made of a solution of India rubber in *Garjan* oil. The merits of *Garjan* oil have at all events not received sufficient attention by the manufacturer and Sir William O'Shaughnessy's opinion may be here quoted in favour of the desirability of the matter being looked into in the future. Sir William wrote fifty years ago that *Garjan* was likely to be found a perfect substitute in the arts for the expensive balsam of copaiba now much used in the preparation of colourless varnishes and drying paints. In the coarser kinds of house and ship painting *garjan* balsam is used as an excellent substitute for linseed oil. Dr Wight also speaks highly of the property of *garjan* in preserving wood &c from the attacks of insects its defects are slowness of drying thin body when dry and liability to being brittle.

PROPERTIES
AND USES.

TESTS FOR GARJAN COPAIBA AND HARDWICKIA BALSAMS—Dr Watson says Its entire solubility in coal naphtha proves the absence of any of the soft resin which exists in most of the copaiba of commerce. It may be distinguished from Copaiba or the balsam of *Hardwickia* thus shake up 1 drop of the balsam with 19 of carbon bisulphide add one drop of nitro-sulphuric acid and agitate. Copaiba will show faint reddish brown with a deposit of resin on the sides of the tube *garjan* intense purplish red soon becoming violet while *Hardwickia* will not alter from its pale greenish yellow.

GARJAN
TESTS
720

Divi-divi, or Libi-dibi see *Cassalpinia Coriaria Willd Vol II p 6*
LEGUMINOSÆ

DOCYNIA, *DCne* (not described in *Genera Plantarum*)**Docynia indica, DCne Fl Br Ind II 369 ROSACEÆ****721**

Syn—*PYRUS INDICA Roxb Wall Pl As Rar II 56 t 1731 CYDONIA INDICA Spach*

Vern—*Sopho KHASIA Mehul passy NEPAL Likung LEPCHA*

References—*Roxb Fl Ind Ed C B C 406 Kurr For Fl Burma I 441 Gamble Man Timb 161 Cat Trees Shrubs and Climbers of Darjeeling p 37*

Habitat—A small tree of the Eastern Himalaya from Sikkim (4 000 to 6 000 feet) Bhutan (7 000 feet) and Assam the Khasia Hills Manipur (5 000 feet) to Burma

Food—Produces a FRUIT which is yellow green with orange patches is 1 to 1½ inches in diameter and rounded at the base. When ripe the fruit has a slight quince flavour and is eaten when half ripe by the hill tribes. The ground is often literally covered with the fruits of this tree and in that state they are largely eaten by wild animals. They ripen in September whereas those of the allied plant the Quince (*Cydonia vulgaris*) begin to fall from the trees in April.

FOOD
Fruit
722**Dock, see Rumex****Dodder, see Cuscuta reflexa, Roxb Vol II, No 2508, p 671****DODECADENIA**, *Nees Gen Pl, III 160***Dodecadenia grandiflora, Nees Fl Br Ind, V 181 LAURINÆÆ****723**

Syn—*TETRANTHERA GRANDIFLORA Wall ? LAURUS MACROPHYLLA Don Prod Nepal 64*

References—*Brandis For Fl, 381 Kurr For Fl Burma II 304; Gamble Man Timb 304*

D 723

DODONÆA
viscosa**Dodonæa—the Switch Sorrel****TIMBER**
724**Habitat**—A moderate sized tree of the Temperate Himálaya from Kumáon eastward to Burma**Structure of the Wood**—Not known to be of any important use**DODONÆA**, Linn *Gen Pl*, I 410 & 1000

A genus of some 40 shrubs (rarely trees) only one of which occurs in India but the literature of that species has been disfigured through its having been described under many names. The genus is named in honour of **Dodonæus** (Rembert Doddens) a famous botanist and physician

[SAPINDACEÆ

725**Dodonæa viscosa**, Linn *Fl Br Ind* I 697 *Wight Ic*, t 52

Syn—*D. dioica* Roxb. *D. angustifolia* Linn f. *D. burmanniana* DC. *D. pallida* Miq. *D. microcarpa* DC. *D. wightiana* Blume. *D. pentandra* Griff. *Ptelca viscosa* Linn. *Dodonæa spathulata* Sm. *D. arabica* Hochst.

Vern.—*Alár* (Plains of Northern India) **HIND** *Sanatha* **HAZARA** *Sanatta mendru ban mendu santha mendar* Pb. *Ghuráske vera vena* (*shumshad*?) **TRANS INDUS** *Ghuraskai* (or *ghoraskai*) *wuraskai* **PUSHTU** *Mirandu* **KANGRA** *Pipalu* **SIMLA** *Banderu* C P. *Ban durg* (Kanara) **BOMB** *Lutchmi* (according to Dalz & Gibbs) **MAR** *Dáwa ka jhar* (according to Graham) **BELGAUM** *Bándari sakhmi* (according to Dymock) **BOMB** *Viral* (in Ceylon) **TAM** *Bandaru golla pulleda bundédu* **TEL** *Bandurg* *bandrike* (*bandu* according to Cameron) **KAN** *Fta werella* (Trimen) **SING**

References—Roxb *Fl Ind Ed C B C*, 324. Voigt *Hort Sub Cal* 96. Brandis *For Fl* 113. Kurz *For Fl Burm I* 287. Gamble *Man Timb* 101. Thwaites *Fn Ceylon Pl* 59. Dalz & Gibbs *Bomb Fl* 36. Stewart *Pb Pl* 31. Aitchison *Cat Pb and Sind Pl* 34. *Fl Andh* by Sir W. Elliot 22. 61. Stewart *Bot Tour in Hasara* *Dymock Mat Med W Ind 2nd Ed* 191. Baden Powell, *Pb Pr* 578. Atkinson, *Him Dist* 338. *Indian Forester II* 390. V 13. 32. VI 238. VIII 30. 35. IX 357. 469. XII 551. *Bomb Gas* XV 68. *Gazetteer Dera Ismail Khan* 18. *Settlement Rep Hasara* 95. *Gazetteers*—Banu 23. *Shahpur* 69. *Hoshiarpur* 12. *Peshawar* 27. *Kawalpindi* 12.

Habitat—An evergreen shrub met with in the North West Himálaya from the plains up to 4 500 feet in the Panjáb Sind and South India (ascending to 8 000 feet and attaining here the size of a small tree) also in Burma and planted throughout India as a hedge

Medicine—Said to have febrifugal properties. The LEAVES are viscid and have a sour bitter taste from which fact it is in Jamaica called the Switch Sorrel. Lindley (*Veg King* 384) says the leaves are used in baths and fomentations. The WOOD he adds of *D. dioica* is carminative and *D. thunbergiana* is said to be slightly purgative febrifugal, and aromatic.

SPECIAL OPINIONS—§ This PLANT has been identified for me by Dr Dymock. It grows about Belgaum. Dr Graham in his *Catalogue of Bombay Plants* mentions that *D. burmanniana* is known in Belgaum as *Dawá ka Fhár*. It is believed that the powdered leaves of *Bendugi* applied over a wound will heal it without leaving a white scar. It is applied in burns and scalds said to be useful also in rheumatism. Dr Dymock gives its Bombay name as *Zakhmi* from which it may be implied that it is used in the treatment of wounds' (*Surgeon Major C T Peters M B Zandra South Afghanistan*).

Fodder—Stewart says the LEAVES are hard and dry, and are only eaten by cattle when very hungry. Reported to have not agreed with the camels at Thal, Afghanistan, during the late campaign.

MEDICINE
Leaves**726****Wood****727****Plant****728****FODDER**
Leaves.**729**

Dogs, Wolves, Jackals, and Foxes	(G Watt)	DOGS, &c
<p>Structure of the Wood —Sap wood white heartwood extremely hard and close-grained dark brown with an irregular outline It is used for engraving turning tool handles and walking sticks and the branches to support the earth of flat roofs It is likely to be important in reclothing denuded tracts like the Siwālik hills of Hoshiārpur</p>		<p>TIMBER 730</p>
<p>Domestic Uses —The LEAVES and TWIGS are employed to manure fields in Madras The plant is useful as a hedge Elliot says the wood is extensively used for fire-wood and the smaller twigs are formed into faggots The name <i>bandedu</i> in Telegu is said to mean Touch wood implying the ease with which it may be ignited</p>		<p>DOMESTIC USES Manure. 731 Leaves 732 Twigs. 733</p>
<p>Dog rose, see <i>Rosa canina</i>, Linn ROSACEÆ</p>		
<p>[India pp 134—155]</p>		
<p>Dogs, Wolves, Jackals, and Foxes, <i>Blanford's Fauna of British</i></p>		734
<p>It is not proposed to discuss here the probable history of the domesticated dog or even the forms of it met with in India The reader is referred to <i>Darwin's Origin of Domesticated Animals and Plants</i> The so-called wild dog of India is however more nearly allied to the wolf and the jackal than to the domesticated dog and is more difficult to tame than either of these animals This remark is made in order to remove the often repeated statement (by popular writers) that the Pariah dog of India is the wild dog domesticated or that the wild dog is the domesticated dog gone wild</p>		
<p>The TRUE WOLF (1) (<i>Canis lupus</i>) rarely occurs south of the Himālaya though specimens have been shot in Sind and it is fairly common in Baluchistan and Gilgit The INDIAN WOLF (2) (<i>C. pallipes</i>) is common south of the Himālaya in the open country but is rare in wooded or hilly tracts It is uncommon in Bengal The JACKAL (3) (<i>C. aureus</i>) is plentiful throughout India and Ceylon on hills and plains forest and open country ascending the Himālaya (for example at Simla) to an altitude of 8 000 feet It is rarely found in Lower Burma but is abundant in Assam and Upper Burma The INDIAN WILD DOG (4) (<i>Cyon dukhunensis</i>) occurs throughout the Himālayan forests from Baluchistan Gilgit and Kashmir to Assam and Manipur The MALAY WILD DOG (5) (<i>C. rutilans</i>) is said to extend from Borneo Java Sumatra and the Malay Peninsula to Tenasserim in Burma The INDIAN FOX (6) (<i>Vulpes bengalensis</i>) is common in most open tracts of country whether cultivated or waste The HOARY FOX (7) (<i>V. cana</i>) occurs in Baluchistan South Afghanistan and Sind while the INDIAN DESERT FOX (8) (<i>V. leucopus</i>) inhabits the dry and semi desert regions of Western India Sind Cutch Rājputana the Panjāb, and North West Provinces The COMMON FOX (9) (<i>V. alopecus</i>) is met with on the Western Himālaya in brush woods near cultivation from about 5 000 feet to the limits of snow and the SMALL TIBETAN FOX (10) (<i>V. ferriatus</i>) appears to occur chiefly on the northern slopes of the Himālaya as at Lassa Dr Stoliczka, however mentions it in the upper basin of the Sutlej</p>		<p>True Wolf 735 Indian Wolf 736 Jackal 737 Indian Wild Dog 738 Malay Wild Dog 739 Indian Fox 740 Hoary Fox 741 Desert Fox. 742 Common Fox. 743 Tibetan Fox. 744</p>
<p>Skins —Most if not all of the above-mentioned animals are killed for their skins and on that account mainly have they been enumerated in this work In the <i>Gazetteers of India</i> reference is often made to these skins Thus in Broach the Wolf's skin is said to be soft handsome and much valued The Jackal's skin is made into caps and the Fox's into fur coats rugs &c Definite information is however not available as to the actual extent these skins are utilised nor of their relative merits</p>		<p>SKINS 745</p>
<p>Food —Dog's Flesh —Being carnivorous most of these animals carry off and devour domesticated animals the wolf having been often known to</p>		<p>FOOD 746</p>

DOLICHANDRONE stipulata**Dolichandrone Fibre****FOOD**

eat even children The Bengal fox lives largely on fruits such as those of *Grewia Zizyphus* &c also field rats lizards &c The late Mr A de Rospstorff refers to the fact that the Andaman domesticated dog lives largely on cocoa nuts while those of the orange groves of the Khásia hills are fed like pigs on oranges In the Nága hills and indeed throughout India the dog is mainly fed on rice But with the Nagas this is so on purpose as the dog constitutes an important item of human food Sheep and goats are rare in the Naga country owing to the preference paid to dog's flesh Before being killed the dog is often made to eat as much rice as possible Soon after he is killed and cooked the contents of the stomach being considered a special luxury

Dog's Flesh
747

Dog-wood, see *Cornus sanguinea* Linn Vol II No 1975 p 572

DOLICHANDRONE, *Siem Gen Pl II 1046***748****Dolichandrone falcata**, *Seem Fl Br Ind IV 380 BIGNONIACEÆ.*

Syn — *SPATHODEA FALCATA* Wall BIGNONIA SPATHACEA Roxb
BATR VIRENS Roth

Vern — *Hawar* OUDH *Mendal manehing* BANSWARA *Kanséri MEY*
WAR *Mersingh bh l*, C P *Messinge kanseri mendal manehing*,
BOMB *Mersing* MAR *Karanjelo KURKU Kadathie TAM*
Udda wodi TEL Nirpongiam MALAY

References — *Koxb Fl Ind Ed CBC 492 Brandis For Fl 350*
Beddome Fl Sylv t 71 Gamble Man Timb 276 Dals & Gibs
Bomb Fl 160 Indian Forester III 204 Bomb Gas III 201

Habitat — A small deciduous tree met with in Oudh Rajputana Central and South India

Fibre — A blackish coarse BAST fibre obtained from this plant was sent to the Amsterdam Exhibition by the Forest Department of Madras

Medicine — A decoction of the FRUIT is used medicinally

Structure of the Wood — Whitish hard close and even-grained seasons well and becomes shining and glossy it has no heartwood Annual rings indistinct Is used for building and agricultural purposes

Domestic Uses — The FRUIT is placed by the Hindus on a bridegroom's waist

FIBRE**Bast****749****MEDICINE****Fruit****750****TIMBER****751****DOMESTIC****Fruit****752****753****D Rheedu**, *Seem Fl Br Ind IV 379*

Syn — *SPATHODEA RHEEDII* Wall *Wight Ic t 1339*

Vern — *Thakutma* BURM *Deva danga (da nga)* SING

References — *Kurs For Fl Burm II 234 Beddome Fl Sylv Man*
168; Rheede Hort Mal VI t 29 Livard Dyes 33

Habitat — A small tree of Burma Malabar Ceylon and the Andamans

Fibre — Yields a fibre similar to that of the preceding

Structure of the Wood — White soft

FIBRE**754****TIMBER****755****756****D stipulata**, *Benth Fl Br Ind IV 379*

Syn — *SPATHODEA STIPULATA* Wall BIGNONIA STIPULATA Roxb

Vern — *Pettan mahlwa (bet than of Mason)* BURM

References — *Roxb Fl Ind Ed CBC 494 Kurs For Fl Burm*
II 234 Gamble Man Timb 726 Mason's Burma & Its People
app 411 543 794

Habitat — A moderate-sized deciduous tree of Burma and the Andaman Islands

D 756

Horse Gram or Kooltee (or kúlti)

(G Watt)

DOLICHOS
biflorus.

Structure of the Wood—Heartwood orange-red beautifully mottled hard close-grained weight 54 58lb a cubic foot The wood is used for bows spear handles oars and paddles Major Ford says it is a durable wood for house posts and makes good furniture

TIMBER
757**DOLICHOS**, Linn Gen Pl I 540

A genus of twining herbs containing some 20 species of which six are natives of India the others occurring in the tropics of both hemispheres The generic name **Dolichos** is of Greek origin but it was more probably originally given to some cultivated species of **Phaseolus** than to any of the plants now designated **Dolichos** by botanists The word **Dolichos** occurs in **Theophrastus** and **Fasolus** in **Dioscorides** The former has now been referred to the scarlet runner (**Phaseolus multiflorus**) and the latter to the dwarf haricot (**Phaseolus vulgaris**) and in modern Greek *fasoulia* survives as the name for the common haricot a plant once on a time viewed as of Indian origin (Conf with the remarks at page 185)

Dolichos biflorus, Linn Fl Br Ind II, 210 LEGUMINOSÆ

758

HORSE GRAM OR KOOLTEE**Syn**—**D UNIFLORUS** Lam **GLYCINE UNIFLORUS** Lam

Vern—**Kulthi** (or **kulti**) **gahat** HIND **Kurti kalai** BENG **Horec** SANTAL **Gahat kalath kulthi** KUMAON **Kalatt kulat kulti kol barat** (gulatti the seeds) **rotong rawan kulih kolih gadgi bothngt guar** PB **Kulitha gagli** SIND **Kudki** C P **Kulte kulthi huiga** BOMB **Kulith kulthi** DEC MAR **Kalathi Guz kollu** (vulava in Nellore) FAM **Wulawalli** (or **wulawulu**) **ulava** (Elliot) TEL **Hurali** (Mysore) **hurli** KAN **Muthera** MALAY **Simbi** (a name for all the **Dolichos**) **kulaththa** (according to **Dutt**) **kolutha** (Birdwood) SANS

NOTE—The name **khurti** or **khult** is in the North West Provinces also given to **Cyamopsis psoraleoides**, DC which see Vol II p 673, No 2514.

References—**Roxb** Fl Ind Ed C B C 563; **Dals & Gils** Bomb Fl Supp 23 **Stewart** Pb 11 68 **Aitchison** Cat Pb and Sind Pl 49 **Church** Food Grains of India 102 **Elliot** Fl Andh 185 **Prof Wallace** India in 1887 96 218 **Rev A Campbell** Report on the Econom. Products of Chutia Nagpur No 8147 U C **Dutt** Mot Med Hind 306 318 S **Arjun** Bomb Dugs 40 **Saidzpet** Exp Farm Man & Guide 51 **Report of Exp Farm** 1871 4 12 13 14 1877 97 1879 25 1884 27, **Agri Dept** Report Madras 1876 34 & 35 1878 79 **Baden Powell** Pb Pr 241; **Atkinson** Him Dist 696 **Lisboa** U Pl Bomb 153 217 277 **Birdwood** Bomb Pr 119 **Jour Agri Hort Soc** 1867 68 Vol II 4 (1885) Vol VII **Proceedings** cxviii **Manual** Coimbatore Dist 223 **Descrip & Hist** A c of G davery Dist 68 **Man Trichinopoly** 72 **Bombay Manual** Rev Acc 101 **Revenue Settlement Reports** for C P (Mun alah) 38 (Upper Godavery) 36 (Chanda) 81 for Panjab (Kumaon) 32d (Kangra) 25 27 (Jhang) 84 (Simla) 58 XL App (Hawara) 68 (Hoshiarpur) 94 for Madras (South Arcot) 109; (Glossary to Nellore) **Gautheers** Mysore & Coorg I 60 II 11 Orissa II 15 133 App **Bombay** IV 53 VIII 182 189 XIII, 289 XVI 91 XVII 269

Habitat.—According to the *Flora of British India* there are two forms of this plant α (**D uniflorus**) a sub-erect annual and β (**D biflorus**) a more or less twining plant The habitats of these forms are not separately recorded and **Mr Baker** (the author of the LEGUMINOSÆ in the *Flora of British India*) apparently treats of both collectively when he says that it occurs on the Himalaya to Ceylon and Burma ascending

D 758

DOLICHOS
biflorus**Horse Gram or Kooltee (or Kúlti)****VARIETIES**
759

to 3 000 feet in Sikkim, sometimes cultivated Distributed everywhere in the tropics of the Old World'

Varieties—While the writer does not possess the means of testing the accuracy of his opinions by the inspection of specimens obtained from all parts of India he believes it will be found that a mistake has been made in linking the Himalayan with the plains plant **Roxburgh** refers to two forms one with grey, the other with black seeds both of which he implies are cultivated in Bengal and Madras Of the grey seeded plant (his **D biflorus**) he remarks that it is erect with twining branches and about two to three feet high He then adds 'I have never found it but in a cultivated state' Again This species is much cultivated all over the coast It requires a dry light rich soil In October and November it is sown either by itself or mixed with **Holcus saccharatus**' In the writer's opinion there would appear to be considerable room for doubt as to whether the grey and the black seeded forms of **Roxburgh** are the two forms of modern writers or whether both of **Roxburgh**'s plants constitute but cultivated races of one of these forms In popular works on economic products the Horse gram of Madras is viewed as **D uniflorus** and under either of these names (**D biflorus** or **D uniflorus**) a pulse is described as grown one might almost say in every district of India but chiefly in Madras and Bombay It is somewhat difficult to believe that a pulse of the tropical plains could be the same as that of the Temperate Himaláya of which **Stewart** wrote that it is grown at 7 000 feet or more This will appear the more improbable when it is added that the pulse described as met with in these regions is sown and reaped very nearly during the same periods though in the one case under tropical and in the other under temperate influences

CULTIVA
TION
760**Green**
Manure
761

Cultivation—It may be said of the plains that the pulse here dealt with is grown for either of two widely different purposes —*viz* as a green manure or as food and fodder It has not been found possible to discover the extent to which the former purpose is pursued by the actual cultivators The reports on the subject are more directly connected with Government experimental farms although it would appear as if the experiments described had been the outcome of a recognised native practice **Mr Robertson** in several of the Saidapet Farm Reports deals with the advantages likely to accrue from the use of this pulse as a green manure He writes 'The action of the green manure is two fold *First* the substance of the plant decaying in the soil leaves behind a large quantity of prepared food ready for absorption by the roots of the succeeding crop *secondly* when ploughed in the structures of the green crop add directly to the amount of organic matters in the soil and thus improve its mechanical condition increasing its power of absorbing and retaining moisture and increasing in the case of stiff soils their friability In another place he remarks In several fields crops were ploughed in during the past season and although it is not possible to state what actual value the proceeding had for no experiments were made yet estimating the value of such a manure at **Rs 4** per ton it was necessary to produce about 4 500 lb per acre to cover the cost of growing it In still another report **Mr Robertson** says 'The horse gram (**Dolichos uniflorus**) is well suited for culture on sandy soils for ploughing in as a green manure' Last dry season we raised crops that yielded from 2 000 to 3 000 lb of plant per acre in a period of about twelve weeks during which the rainfall did not amount to one inch In the neighbourhood around Madras the summer crops, on dry sandy land are exceedingly precarious on the average we have not more than one year in four in which crops sown in June or

Horse Gram or Kooltee (or káitli)

(G Watt)

**DOLICHOS.
biflorus.**

July yield returns that repay the expenses of cultivation I think therefore that instead of attempting to grow summer crops' such as *gingelly*, *cumbu* (*Pennisetum typhoides*), &c, except on a small scale on choice land that the wisest course after removing the 'cold weather crop,' would be to clean the soil thoroughly and then to sow it with horse gram for ploughing in. These sowings would in the space of three months or so yield per acre from 2 000 to 3 000 lb of plant which if ploughed in would prepare the soil admirably for the succeeding "cold weather crops."

The advantages from growing the crop as a source of FODDER are extolled by various writers. In one report Mr Robertson says It produces from 2 000 to 4 000 pounds of fodder in two months at a cost of about Rs 3 per ton and thrives with a minimum rainfall in very hot weather. The ease with which it may be cultivated recommends it most highly as a catch crop for forage purposes either to be grazed on the land or fed in the stalls. The plant may be made to grow at almost any season of the year. It will in fact thrive when no other crop can exist. It requires but one shower of rain to start its growth but if even this be not obtained the seeds have the power of remaining for months in the soil and of germinating when rain falls. After the removal of the *rabi* crop it is contended that a highly advantageous course is to rapidly dress the soil sow horse-gram and in a month's time commence to use the stems and leaves as fodder. By this means the soil is saved from becoming baked with the advancing heat of summer and the roots left in the soil greatly improve it even should the cultivator be unable to devote the entire crop as a green manure. Mr Robertson remarks on this point. The small quantity of moisture present in the land at the time of harvest is generally enough to start the crops which are found to give a fair outturn of fodder though there may be no rain whatever during their growth. The advantage of this system is that the land is made use of and kept under tillage during the dry season. He then proceeds to give the results of seven sowings of horse gram which took place between the 26th February and the 10th of March. He adds No rain fell during the growth of any of these crops. It will be seen that about six tons of green fodder worth about Rs 48 were obtained without any rain whatever between March and May. It would be a great boon to the country if the ryots would endeavour to grow horse-gram as far as possible either for fodder to their cattle or for green manure to their summer crops of *gingelly* and *cumbu* immediately after the harvest of their paddy instead of allowing their lands to become hardened as at present.

NATURE OF SOIL SEASONS OF SOWING AND REAPING &c &c OF HORSE GRAM.—The earlier writers seem to have been mistaken as to the requirements of this plant but considerable confusion also exists in the published statements of recent authors which may to some extent be accounted for by the differences in provincial agriculture and climatic conditions. In the passage quoted above for example Roxburgh states that this pulse is grown on a dry light rich soil. Every shade of difference of opinion seems nowever to prevail on this and many other features of horse-gram cultivation many of which (such as yield per acre cost of cultivation &c) have been purposely omitted here but the following brief review province by province may be found instructive.

Madras—Mr Nicholson (*Manual of Coimbatore*) writes that the ryots were in former days allowed to take up new lands for horse-gram cultivation at a quarter the usual rates. He adds 'It grows on the poorest soils with the least possible trouble and with the minimum of rain fall. Gram land is seldom manured otherwise than by casual droppings

**CULTIVA-
TION**

**FODDER
762**

**NATURE OF
SOIL
763**

**MADRAS.
764**

**DOLICHOS
biflorus****Horse Gram or Kooltee (or kult)****CULTIVA-
TION**

of cattle they are usually ploughed sown and the seed covered by a second ploughing if there be time, but if not the seed is simply scattered broadcast over the natural surface and then ploughed in. As it requires only one good rain after appearing above ground it frequently gives a fair crop when nothing else can live. When the south west monsoon rains are too late for *Kambu* it is frequently sown as a substitute in September but it is also sown largely in November after the first burst of the north-east monsoons. It is pulled up by the roots thrown into heaps and then trodden out by cattle. The yield is up to 1200lb. In a recent report contributed by Mr H Sewell Collector of Cuddapah there occurs a similar statement. It requires no cultivation beyond ploughing and grows on any soil. Mr H Goodrich Collector of Bellary writes —

A mixed soil is best suited for the crop. The fields should be ploughed and harrowed once or twice but not irrigated nor (generally) manured. Mr Robertson's experience of the pulse on the Saidapet Experimental Farm has been indicated by several passages quoted above but with regard to the soil &c it may be as well to convey his meaning still further. He says it is a valuable fodder producer for inferior sandy soils. The ease with which it may be cultivated recommends it most highly. But several Madras writers give a very different account of the requirements of this plant. For example in the Survey Settlement Report of South Arcot (see *Selections from the Records of the Madras Govt 1869 p 109*) there occurs the following passage regarding horse-gram (*Dolichos uniflorus*). The land is ploughed four or five different times after the month of May and the gram sown between the latter part of August and the end of September. It is gathered in the middle of March. In the Manual of the Trichinopoly District (by Mr L Moore) page 72 it is stated that *Kollu* (*Dolichos uniflorus*) or horse gram, is a four months crop being sown in October and reaped in February. It is a precarious crop as it requires frequent showers and is destroyed equally by excessive drought or moisture. It is grown to a considerable extent in the Kulittalai Taluk but not much elsewhere. Writing of Trichinopoly recently Mr H Willock says of *Kollu* that the area of this grain under cultivation is about 27604 acres of which 1297 acres are *fash* lands. It is a four months crop sown in October and reaped in February. "It is cultivated generally in sandy soils and also in other soils when the season for appropriate crops is over. Of Cuddapah District Mr H Sewell gives the extent of cultivation in 1887-88 as 14755 acres and the outturn 1770600 measures. He adds. It is sown in October and reaped in February. Of Bellary District Mr H Goodrich writes of 1887-88 that the total area under cultivation of this crop is estimated to be 106805 acres, of which 90013 belong to Government and 16792 are *nam*. The season for sowing is from the 3rd August to 7th October and that of harvesting from 20th December to 21st February. The lowest estimate for the cost of cultivation is given at Rs 12 the highest at Rs 5-8 and the average at Rs 3 2 7 per acre. The profits vary from 4 annas (lowest) to Rs 4 4 (highest) per acre the average being Rs 1-0-2 per acre.

Area.
765

Seed
766

Yield
767

The amount of seed per acre and the yield is variously stated but of Madras Mr Robertson wrote in 1871 that in one experiment 35lb an acre was sown in August and yielded in October 5640lb of green fodder. Another experiment with 24lb an acre, sown in October gave in March 450lb of pulse and 1800lb of straw. But reference has already been made to Mr Robertson's experiments of cultivating for fodder or green manure horse-gram sown in February and March. The present notices regarding the Madras cultivation of horse gram may there

Horse Gram or Kooltee (or kúlti) G (Watt)

DOLICHOS
biflorusCULTIVA-
TION

fore be concluded with a passage from the Saidapet Farm Manual and Guide: It is a hardy plant thriving in the poorest soils. The soils of this district contain a very small proportion of lime, and this plant like all leguminous plants requires a good deal of lime before it can mature its seed. It has been ascertained from experiment, that unless the manure applied contains a considerable percentage of lime, the tendency of the plant under better cultivation is to produce leaf rather than seed. This tendency has been utilised and by deeper cultivation and the application of a moderate dressing of manure we have succeeded in growing good fodder at a very moderate cost.

Generally in preparing land for gram the following method is adopted — After ploughing 4 to 6 inches deep and harrowing the seed is sown in lines if the season is unfavourable and the soil poor close together if the reverse far apart at the rate of from 30 to 40 lb per acre. During growth the crop should be bullock hoed once or twice as circumstances demand and hand hoed at least once. The crop should be cut immediately the flower appears and removed the same day. The cost of growing a ton of fodder is about Rs 3. The fodder makes good hay which possesses a pleasant aromatic smell when well made it, however loses 75 per cent of its weight in curing.

When cut before maturing its seed the cultivation of gram improves rather than impoverishes the soil. There will always be a slight loss in the mineral constituents but still as the plant appropriates such a large amount of atmospheric food and stores it away in its roots, and as these roots weighing from 800 to 1000 lb per acre are left in the soil its condition must be greatly improved.

Bombay — In the *Káthiáwar Gasetteer* (p 189) it is stated that Horse gram *Kulthi Dolichos uniflorus*, is a crop of small importance grown to a limited extent in all parts of *Káthiáwar*. It grows in poor soils, requires ploughing and hoeing, and is sown in July and reaped in October. It is locally used by the poor classes and is given to cattle. Of *Ahmadnagar* the *Gasetteer* (p 269) says Horse-gram *Kulthi* or *hulga Dolichos uniflorus* or *biflorus*, in 1881-82 had a tillage area of 38,153 acres. It is sown with *bajri* in June and ripens in November. It is eaten boiled whole or split as *dal* and in soup and porridge and is also given to horses. The leaves and stalks are good fodder. To contrast with the above in which the horse gram is said to be sown in June the following passage may be given from the *Thána Gasetteer* (p 289) Horse-gram *Kulthi Dolichos uniflorus* is sown in November after the rice crops have been cut and ripens about the beginning of March. *Kulthi* is eaten in the form of pease meal which is called by a number of names. The pease boiled and mixed with gram make very good food for horses. The stalks are used as fodder. *Kulthi* or *hulga* is referred to in several other volumes of the *Bombay Gasetteer* in some of which it is said to be sown in June in others in November. Thus of *Sátára* (p 163), it is said that it is generally sown in June with *bajri* in separate rows and ripens in November. Mr Lisboa in his *Useful Plants* refers to *D biflorus* a twining and *D uniflorus*, a sub-erect plant both having trifoliate leaves and yellow flowers. In the figures published in *Church's Food Grains of India* the twining form has hairy pods and the erect glabrous. It would be instructive to know if the June and November sowings of Bombay were of either or both of these forms in other words whether the one sowing was the twining plant and the other the erect.

North West Provinces — Very little can be discovered regarding the extent to which this pulse is grown in these Provinces and the common name *khult* here more frequently denotes *Cyamopsis psoraleoides* than

BOMBAY
768N-W
PROVINCES
769

**DOLICHOS
biflorus****Horse Gram or Kooltee (or kúlti)****CULTIVA-
TION**

Dolichos biflorus It may be inferred that very little of **Dolichos biflorus** is actually cultivated in the Provinces from the fact that it is not described in Messrs Duthie and Fuller's *Field and Garden Crops*. Mr Atkinson however in his *Himálayan Districts* pp 343 460 696 says Horse-gram—*Gahat kalath* the *kulthi* of the plains. The horse-gram is occasionally grown in the hills up to 6 000 feet and in the sub montane tract. In the Bhábar it ripens in October. A somewhat striking feature of this pulse or bean is the absence of any allusion to it in the *Ain-i-Akbari*. Abul Fuzl the author of that useful record of Akbar's times gives particulars of all the grains pulses oil seeds vegetables flowers and fruits known to the Emperor. Among the pulses and vegetables there occurs *Mung Mash* and *Mooh*—the first two are forms of *Phaseolus Mungo* and the last is *P. aconitifolius* then *Adess* the lentil (*Lens esculentus*) is referred to and *Nakhud* the common gram (*Cicer arretinum*). *Lobiya* is also mentioned but whether we are to translate that as *Vigna Catiang* or as **Dolichos Lablab** seems doubtful. At all events no place is given to *kulthi* and indeed it is questionable if that pulse was known to the Persian writers. This fact is difficult to account for if we admit that the plant of the Himálaya and of Northern India is the horse-gram of Madras but the absence of any knowledge of it admirably corresponds with the present cultivated area of the plant *viz* in South India and Bombay the portions of India over which the Emperor Akbar was never able to extend his supremacy. We might indeed from this fact be pardoned the assumption that the true habitat of Horse gram should be looked for in South India rather than on the Himálaya.

**History of
Kulthi
770****PANJAB
771**

Panjab—Of the Panjab Stewart says 'It is commonly cultivated for its pulse in the Himálaya up to 7 000 feet or more. Occasionally grown outside near the base of the hills at Ambála (Edgeworth). *Kulthi* (**Dolichos uniflorus**) is referred to in the *Gazetteer of Hoshiarpur District* (page 94) as a *kharif* crop sown on the poorest hill slopes which look as if they could produce nothing but stones. In the *Gazetteer of Simla* (page 55) *kulthi* is alluded to as the most common pulse growing freely even upon high meagre soil. The grain is hard and indigestible mottled with specks of a dark colour. It is eaten in the form of *dál*. On a further page it is again alluded to. *Kulat* or *Kolath* (**Dolichos uniflorus**—horse gram) is grown in the inferior *bakhil* lands in the lower villages. Will not grow on the higher lands. Is not sold. Is sown the same time as *Mash* (= *Phaseolus radiatus* *viz* sown in July and harvested in October) but ripens 15 days later. To prepare for eating—it is soaked in water for 12 hours then reduced to a *mash* on a stone then made into round balls and steamed. Another way is to roast the grains and then boil them adding rice.

**CENTRAL
PROVINCES
772**

Central Provinces—In a recent communication Mr J B Fuller says—**Dolichos biflorus** is grown in the southern districts of the Provinces as a cold weather crop. Full details of the area under it are not available but such statistics as are at hand indicate that its cultivation is of importance only in the Chanda Bhandara and Balaghat districts in each of which it annually covers from 3 000 to 4 000 acres. In the Settlement Reports referred to under the paragraph of references mention is made of this pulse, but Mr Fuller's brief note gives the main facts.

**BENGAL
773**

Bengal—Horse gram is very little cultivated in the Lower Provinces. It is said to be grown to a limited extent in Shahabad as a fodder but not grown in lower Bengal. It is however largely cultivated in Chutia Nagpur Division on good land. It is usually sown along with *sirgusa* in August and receives the same treatment and is harvested in November December. The average quantity of seed sown is ten seers per acre,

Horse Gram or Kooltee (or káliti)

(G Watt)

**DOLICHOS
biflorus**

and the average produce two maunds valued at R3. The seed is eaten as *dal* or ground into *satu* after being roasted. In Chutia Nagpur proper about 1½ per cent of the cultivated area is sown under this crop. In Khoorda * Pooree District *kulthi* is usually grown as a second crop on paddy lands. The Rev A Campbell writes that by the Santals this pulse is extensively cultivated on good high lands. It is eaten in the form of *dal* and also as *satu*. To prepare *satu* the pulse is roasted and then ground. It is eaten without being further cooked.

AREA UNDER HORSE GRAM—In some of the above passages reference has been made to the extent this pulse is cultivated. With the exception however of Madras and Bombay it is not of such importance as to require being regularly recorded and a complete statement cannot therefore be furnished for all India. The area in Madras since 1883-84 to present date has ranged from 1 208 780 acres to 1 498 021 acres. The returns for Bombay may approximately be stated to have indicated between one-third and one fourth of that area as under the pulse. In 1887-88 the total of these two Provinces was close upon 1 850 000 acres. The Central Provinces have perhaps about 10 000 acres and in the Berars there are usually some 1 500 acres. It is probable that the rest of India would not represent more than 20 000 acres at the outside so that it may safely be added that if the plant is a native of the Himálaya its area of cultivation is in Madras and Bombay.

TRADE IN HORSE GRAM—No statistics are available and it is only necessary to caution intending foreign purchasers that the *gram* of Madras—the *Horse gram* here discussed—is a perfectly distinct pulse from the *gram* or *Bengal gram* of most writers (For *GRAM* see *Cicer arietinum* Vol II No 1061 pp 274 to 284). This caution is the more necessary since every trade journal and agricultural publication is urging the importance of India as a source of pulses and lentils &c to be used as cattle food. The importation into Europe of the horse-gram of Madras under the false impression that it was the same as Bengal gram might seriously injure the progress of trade and the sale of the pulse. *Lathyrus sativa*, as gram would be attended with such serious consequences (paralysis of the animals so fed) as to prove fatal to the hopes entertained of the expanding pulse and pea trade of India.

Another fact of some importance regarding a trade in horse gram may be here mentioned *viz* that the Madras crop mainly comes into the market in March, April and May while the bulk of that of Bombay and Upper India would appear to be available in November and December.

EXTENT TO WHICH USED AS HUMAN FOOD—It is scarcely necessary to refer to this subject in a separate paragraph since the most important passages regarding it have already been quoted. Although not deemed a superior pulse it is largely eaten by the poorer classes either after being boiled or in the form of a meal variously prepared. Dalzell and Gibson (*Supp Bombay Flora* p 23) say that when a spur or ergot grows on the seed it is often very deleterious.

CATTLE FOOD—As a fodder for cattle and horses the STEMS and LEAVES of this plant are highly valued all over India and the BEAN appears to constitute the chief article of diet given to horses in the Madras Presidency. The split husk also is used in Madras as a cattle food. Numerous experiments have been performed to test the value of *kulthi* both as a fodder and a cattle-food. Mr Robertson ascertained the merits of boiled as compared with steeped horse-gram on draught cattle. He reports—A lot of 16 draught cattle similarly worked were equally

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* See Taylor's Settlement Report on Khoorda Government Estates

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divided Besides their usual fodder one lot got 12 pounds of boiled gram and 12 pounds of ground nut cake and the other lot received daily 12 pounds of steeped gram and 12 pounds of ground nut-cake The results were as follows —

Animals on Boiled Gram

Weight at the commencement of the experiment	Pounds
Do twenty seven days afterwards	6 339
	6 576
Increase	237

Animals on Steeped Gram

Weight before the commencement of the experiment	6 310
Do twenty seven days afterwards	6 576
Increase	266

A similar series of experiments were performed with horses and the verdict arrived at was in favour of steeped gram Mr Robertson performed a further experiment to test the comparative feeding values of maize and horse gram He reports for the first few days maize was not readily eaten however at the end of a couple of weeks, the cattle ate it freely and continued to increase in weight until at the termination of the experiment they had increased 71 pounds in weight The other pair ate gram from the first but they never made the progress observed by the pair fed on maize and at the termination of the experiment had only increased 3 pounds in weight This fact might to some extent be accounted for by the beneficial effect of a change irrespective of the merits or otherwise of the maize diet

Another series of experiments were conducted in order to determine the value of gram fodder in comparison with grass and cholam fodder as food for sheep The animals fed on grass only gave an increase of 8 26 pounds per each 100 pounds of their live weight whilst those fed on gram fodder gave 14 5 pounds and those on cholam fodder 15 58 pounds The grass was the inferior stuff usually cut for horses In the *Khandesh Gasetteer* (p 152) it is stated that many persons prefer *kulthi* to gram (presumably Bengal gram) in feeding horses It is much to be regretted that no one appears to have published the results of definite experiments to test the relative merits of Bengal gram (*Cicer arietinum*) and Horse gram (*Dolichos biflorus*) Such experiments would afford exporters the means of judging whether they should commend most the Bengal or the Madras staple article of horse food to European dealers The chemical analysis taken from *Professor Church's Food-Grains of India* (given below) would however justify the preference being shown to Bengal gram —

CHEMISTRY OF THE HORSE GRAM

Professor Church publishes the following table of analysis —

Composition of Horse gram

	In 100 parts, unhusked	In 1lb	
		oz	grs
Water	11 0	1	333
Albuminoids	22 5	3	262
Starch	56 0	8	420
Oil	1 9	0	133
Fibre	5 4	0	378
Ash	3 2	0	224

Horse Gram or Kooltee (or kúlti)

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The Professor concludes from this result that 'the nutrient ratio is 1 27 and the nutrient coefficient 83. The ash of these beans contains nearly one third of its weight of phosphoric acid. The long continued use of these beans is regarded as injurious; they are reputed, in some districts, to cause oedematous swellings.' The writer is not aware of the source from which Professor Church derived the statement that the long continued use of this pulse is injurious. If he alludes to injury done to cattle and horses it would be difficult to account for the fact that it is apparently the chief article of diet given in Madras to cattle and has been so from the very earliest records, but apparently no such opinion of injury done thereby prevails in South India. At the same time the continued feeding on pulses is by some authors condemned and one pulse already alluded to would seem to have distinctly an injurious effect (*Lathyrus sativa*).

The analysis given above if compared with that recorded under *Cicer arietinum* (Vol II p 280) will be seen to justify the assumption that Bengal gram is superior to that of Madras. In the former a larger percentage of albuminoids and oil exists which manifest a result expressed by Professor Church thus—nutrient ratio of Bengal gram 1 33 and the nutrient value 84.

Oil—The BEANS are said to yield an oil of which little is known.

Medicine—Stewart says the SEEDS are used medicinally in the Panjáb. S Arjun in his *Bombay Drugs* p 40 has the following remark about *Dolichos uniflorus*. There are two varieties of this—the red and the white. Both are used for similar purposes. The DECOCTION is used by native females in leucorrhœa and menstrual derangements; it is also given to parturient females to promote discharge of the lochia.

Special Opinion—§ Sanskrit writers recommend the use of the pulse of this plant as a demulcent in calculus affections, cough &c. Its employment is said to reduce corpulence. The wild variety is said to be particularly serviceable in eye diseases." (U C Dutt Civil Medical Officer Serampore).

Food—The PEA is eaten by the poorer classes of natives and the PODS and PEAS are also eaten by horses and cattle. The STRAW is a much prized fodder.

Dolichos cultratus, Syn for *Dolichos Lablab*

D fabæformis, *L Herit* see *Cyamopsis psoralioides*, DC

D Lablab, *Linn Fl Br Ind II 209*

Vern—*Sim* or *sim* makhan *sim* lobia (or *lôbiyâ*) *val* borboti (wall according to Stocks) **HIND** *Sh m* makhan *sim* borboti, *ghesa sim* panch *sim* lablab *gurdal shim* *bun shim* panch *shim* *ganchi shim* &c **BENG** *Malhan* **SANTAL** *Urohi* *urshi* *uri* **ASSAM** *Kechu* **NAGA** *Shimi chimi*, *sém* *sémbi* **N W P** *Katjang* (?) **Vigna Catiang**) *kála* *lobia* **PB** *Wall* (according to Birdwood) **SIND** *Pauti* *valpapi* or *valapipadi* **BOMB** *Paote* *val* **MAR** *Vâl* **GUZ** *Mochai* **TRI** *CHINOPOLY* *Bili* *manavare* or *man avare* **MYSORE** *Mutcheh* (according to Birdwood) *avare* **TAM** *Alsanda* *boberlu* *tella* *chikurhai* (*anumulu* *adavi* *chikkudu* *tella* *chikkudu* by Elliot) *annapa* *anapa* *chikkudu* **TEL** *Avare* *avre* **KAN** *Pa* **BURM** *Simbi* or *shimbi* a name most frequently assigned to this species (*nespava* or *nishpáva* given by some writers is **Vigna Catiang**) **SANS** *Lobiya* (according to Stocks) **PERS**

NOTE.—The names *Lobia* and *lôbiyâ* given above for this species are in the writer's opinion wrongly so applied, and should be assigned to **Vigna Catiang**.

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References —Roxb *Fl Ind Ed C B C* 560 *Dals & Gibs Bomb Fl Supp* 23 *Stewart Pb Pl* 67 *Atkinson Cat Pb and Sind Pl* 40 *Sir Walter Elliot Fl Andhr* 10 15 16 175; *Rev A Campbell Econ Prod Chhuttia Nagpur Nos* 9249 and 8155 *Stock Account of Sind Church Food-Grains of India* 161, *DeCandolle Origin Cult Pl* 346, *Murray Pl and Drugs Sind* 127 *Mason Burma and Its People* 466 *Atkinson Him Dist* 696 *Duthie & Fuller Field and Garden Crops II* 23; *Lisboa U Pl Bomb* 153; *Birdwood Bomb Pr* 119, *Asn i Akbari Blochmann's Transl* 63 *Your Agri Hort Soc V (New Series)* p 37 *Indian Forester IX* 203

Habitat —Wild and cultivated throughout India ascends to 6 000 or 7 000 feet on the Himálaya This climber may be seen growing along the borders of fields which contain tall crops being left to twine round the plants near the margin In some parts of the country the castor oil plant is a favourite support The *shím* is also grown very commonly round houses being allowed to climb on the walls and roof

History —Some idea of the probable history of *Dolichos biflorus* may be gathered from the series of quotations given above from numerous authors and from the very extensive collection of vernacular names most of which seem to be derived from the Sanskrit *Kuluttha* The remarks made in the paragraph devoted to the cultivation of that species in the N W Provinces may be specially read in this connection **M A DeCandolle** (*Origin of Cultivated Plants*) deals with two (or what the writer regards as only one) species of *Dolichos* viz **D Lablab** *Linn* and **D Lubia** *Forsk* He does not treat of *D biflorus* although it is perhaps a more important cultivated plant in India than **D Lablab** The line of reasoning urged by **DeCandolle** seems largely to turn on the origin of the word *lubia* He says Oriental scholars should tell us whether *lubia* is an old word in Semitic languages I do not find a similar name in Hebrew and it is possible that the Armenians or Arabs took *lubia* from the Greek *λοβος* which means any projection like the lobe of the ear a fruit of the nature of a pod and more particularly according to **Galen** *Phaseolus vulgaris* *Lobion* (*λοβιον*) in **Dioscorides** is the fruit of **P vulgaris** at least in the opinion of commentators It remains as *lobion* in modern Greek with the same meaning The word *Lobiya* occurs among the list of autumn crops known to Akbar According to some modern writers it is in Upper India almost generic for beans although applied more especially to two plants viz **Vigna Catiang** and **Dolichos Lablab** The former comes into season in the autumn (*kharyf* crop) while in the N W Provinces and the Panjab the latter is sown in autumn and reaped in February and March so that it is a spring (*rabi*) crop These seasons do not of course apply to all parts of India since for example in Assam and some parts of South India **D Lablab** ripens in December The *Asn i Akbari* (a work written in Persian) describes the crops grown in Delhi and Agra during the reign of the Emperor Akbar A pulse *Lobiya* is there spoken of as a *kharyf* crop As at the present day so in all probability in Akbar's time this would have been **Vigna Catiang** This is of importance since the word *Lobiya* appears to be of Persian not Sanskrit importation into the languages of India Persian scholars do not seem to share **M DeCandolle's** ideas regarding a derivation of *Lobiya* *lubiyá* *lubiya* or *luba* from *λοβος* The word is accepted as of pure Persian origin and in **Johnson's Persian Arabic and English Dictionary** is given as a kind of pulse It may here be added that *labáb* in Arabic means green fodder But even if the Persians borrowed the word from the Greeks the contention here advanced would still remain in its full force It came to India through the Persians Hence the writer is disposed to restrict the word *lobiya* to **Vigna Catiang**, and if this proves correct

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it is probable none of the species of *Dolichos* were known to the Persian or Arabic writers of classic times. This conclusion would assign to the species of *Dolichos* an Indian origin, an idea practically confirmed by the almost universality of certain derivative names in the languages of India traceable to the Sanskrit and not to Persian or Arabic, and by the fact that *Dolichos Labiab* exists as a purely wild plant in Bengal and some parts of Madras. No name like *lobiyá* is given to any pulse by the aboriginal races of Indian or by those of Aryan origin. It occurs purely among the people of Upper India where Persian influence is most pronounced.

In the *Gazetteers of the North Western Provinces* the name *lobiyá* occurs frequently as that of a pulse, but in Kumáon it is said to be the name for *Vigna Catiang*. In the volume on the Eta District (p. 27) it is remarked that *lobiya* known as *masina* is sown with the millets as a rain crop. Again *lobiya* is the Persian form of *ramas* and *ramus* is here usually called *rausa*. *Ramas* and *rausa* are names given throughout these provinces for *Vigna Catiang*. Of the Meerut District it is said that *lobiya* (*Vigna Catiang*) is a *khari* or rain crop but that *masina* is applied to linseed. In the *Budaun Gazetteer* *lobiya* *Dolichos sinensis* (a synonym for *Vigna Catiang*) are given as the names of a *khari* crop but these names are mentioned in the *Bijnor Gazetteer* as that of a spring crop. This latter statement may be the result of a mistaken identity or then the plant referred to is not *Vigna Catiang* but may possibly be *Dolichos Labiab*. But if this be so in Bijnor alone of all the districts of the North West Provinces is the name *lobiyá* given to a spring pulse presumably *Dolichos Labiab*. In the *Indian Forester* (IX 203) *lobia* *Vigna Catiang* is referred to as one of the most useful of the bean tribe for rainy season cultivation. It is said to continue to yield till the beginning of the cold season.

Of the Panjáb Stewart says *Dolichos Labiab* is known as *catjang* and *kala lobia* (the black *lobia*) but he is the only writer who says so. He gives *lobia* itself to *Vigna Catiang* and it seems probable he was mistaken regarding *Dolichos Labiab*. Mr. Baden Powell a subsequent writer speaks of *Dolichos sinensis* as *lobiyan* but he refers to a black pulse under the name *Dolichos Labiab*? which was obtained from Hushyápur and Gujrat. This bore the vernacular names of *keo karun* or *kala mung*. There would seem little doubt but that this is the *kala lobia* of Stewart and it is probable Stewart added the word *lobia* (an Anglo-Indian generic name for beans) much after the same principle as Baden Powell gives the paragraph heading *lobiya* to an account of a Kashmir bean the botanical name of which he gives as *Phaseolus vulgaris*, *L* and *P. lunatus*, *L* red and white haricot beans (mixed). These he adds are exhibited from Srinagar called in Kashmir *dhakh*. The paragraph heading for the Kashmir bean should therefore have been *dhakh* but accepting *lobiya* as a better known name it was apparently given instead of the local name.

There is however another point of some interest regarding this notice of a Kashmir bean. If correctly referred to *Phaseolus vulgaris* this is the only instance on record of that introduced plant bearing what appears an indigenous vernacular name. Accepting Peddington's Index of the Vernacular Names of the Plants of India as correct, M. DeOandolle discusses the claims of India to a share or otherwise in the production of the haricot bean. Peddington it would appear gives that vegetable the names of *loba* and *bakla* and DeOandolle adds. This together with the absence of a Sanskrit name points to a recent introduction into Southern Asia. The haricot bean though fairly extensively cultivated in India is met with only in the gardens of the Europeans or in the hands of cultivators who

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trade in meeting the European demand. It can in no way be said to be a regular article of native cultivation and the name *loba* if ever assigned to it must be viewed as but a modern adaptation of a semi generic appellation for introduced peas or beans. But to return to the mention of the word *lobiya* in Panjáb recent publications. In the *Gasatteers* of the various districts **Dolichos Labiab** is practically ignored while **Vigna Catiang** is frequently mentioned. That pulse is for example *song* in Kangra *ranyan* in Simla *rawan* in Montgomery and *lobia* or *chaula* in Gurgāon. Thus *lobia* appears as a synonym along with other and more distinctly Indian names for **Vigna**. *Chouli* is a very frequently used Hindustani name for it. *Chouli* in Chanda *chaunro* in Sind *Chouli chola* *safed lobeh* (white lobeh) *kurrea lobeh* and *gat-vál* in Bombay. Thus ever here and there the name *lobiyá* crops up in connection with **Vigna**, though practically no authentic case is known of its being given to **Dolichos Labiab**. In South India that name scarcely exists except perhaps with Europeans. **Vigna Catiang** is *alasandi* in Kánarese *káramanalu* *alachandalu* or *bobbarlu* in Telegu and passing up the east coast to Orissa it becomes *lobiya chhas* in Uriya.

The final conclusions which the writer has arrived at regarding the word *lobiya* may be expressed briefly —(1) It is incorrectly applied to any species of **Dolichos** or **Phaseolus**. (2) it is of Persian origin and may by adaptation have been assigned by the early Persian and Mogul conquerors of India to **Vigna Catiang**, but (3) as used by the Indian market gardeners of the present day it is a generic name for any introduced pulse or bean and is in no way specific. A similar expression exists in the use of **Labiab** for the vegetable or unripe pods of beans such as those of **Dolichos Labiab**. The probable origin of **Vigna Catiang** and its claims to being the true *Lobiya* of Indian (Persian) writers will be dealt with in a further volume of this work.

Having thus in a measure disposed of the confusion caused through the association of *lobiya* with **Dolichos Labiab** there remains little to be said regarding the history of **Dolichos Labiab** itself. The existence of it as a wild plant combined with the extensive series of vernacular names especially those of Lower Eastern and Southern India leave no room for doubt as to its being a native of India and more especially of the portion of India indicated as the area of its indigenous habitat. The Sanskrit names given to it are doubtfully correct and although we may be unable to follow DeCandolle in the idea that according to Sanskrit literature it has been cultivated in India for 3 000 years there is everything in favour of the supposition that it was a regularly cultivated crop long anterior to the Aryan invasion of India. It may thus at an early date have had assigned to it the Sanskrit names from which some of the vernacular names for the plant are clearly derived. This conclusion would considerably enhance the antiquity of its cultivation in India.

CULTIVATION

Madras—In the Trichinopoly Manual **Dolichos Labiab** is said to be a six months crop sown in July and August reaped in February and March. In a report furnished for the present work the Collector (Mr H Willock) says the area of cultivation is 3 934 acres. The annual outturn per acre amounts in value to ₹10 the cost of production being ₹5. He adds that it is cultivated on all soils along with the staple food grains. Mr H Goodrich Collector of Belláry writes that the area in his district under this crop is only 350 acres. It is sown from June to August and reaped from October to December. It is usually sown with other pulses in the proportion of 1 to 5. The cost of cultivation and profit cannot therefore be

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properly estimated Black, red and mixed soils are all adapted for its cultivation The fields should be ploughed and harrowed, and the seeds sown with a drill along with other pulses and *cholum* This grain he adds is eaten by the lower classes in place of *dhal* and also made into a stew The Collector of Cuddapah (Mr H Sewell) says he is familiar with three kinds of this pulse white red and black The season of sowing and harvesting and the cost of production is the same as that of horse-gram (see above—*Dolichos uniflorus*) It is also largely grown in Coimbatore and Salem and of Acrot it is said to be sown along with lamp-oil seed In the Manual of the Tanjore District repeated mention is made of various forms of *Dolichos* "*Avare* *Lablab vulgaris* is reaped in December and January is cultivated in gardens and supported on poles often forming arbours about the doors of native houses The green pods alone are cooked the tender ones being preferred' *Valavarangáy* *Dolichos cultratus* is sown and reaped at the same seasons as the above and is said to be cultivated solely for its flat oblong legumes which are used in curries *Mocce* *Lablab vulgaris* and *Karámani* *Dolichos sinensis* sown in July and August and reaped in January and February on unirrigated land often grown as auxiliary crops along with a shorter dry crop such as *rugi* or *cholum* more common in the delta' It seems probable that the two last mentioned plants are *Vigna Catuag* In the Madras Manual of Administration (II 289) it is said that *Dolichos Lablab* is chiefly used for feeding bullocks

Mysore and Coorg—In the *Gazetteer* of these provinces repeated reference occurs to this pulse but definite information is not furnished as to season soils method of cultivation &c

Bombay—Lisboa (*Useful Plants of Bombay* p 153) says It is extensively cultivated all over India especially during the cold season on the sloping lands along the banks of rivers The seeds are much relished they are boiled and eaten Turning to the *Gazetteers* and *Agricultural Department Reports* for more explicit information as to the cultivation of this pulse in Bombay it is said of Thana District that *vál* *Dolichos Lablab* an important crop is like *udid* sown in the standing rice in small holes made between the plants two seeds being dropped into each hole The beans are used as a vegetable and the stalks as fodder for cattle Of *Káthiáwár* it is reported The large fruited kidney *vál* *Dolichos Lablab*, is a crop of small importance found in the Nagher on the south coast There is only one kind of *vál* which grows in sandy soil and is sown in the beginning of the rains and reaped in the middle of the cold weather The soil requires ploughing manuring and weeding It is locally used as human food Since compiling the above Mr Muir Mackenzie has kindly furnished the following note regarding this pulse in the western Presidency

The plant frequently follows rice in the South Marhatta country as a second crop and is reaped in February and March and is sown as a second crop with the *Kharif* millets (*Bayra*) It is also a favourite crop in river beds and is much grown on irrigated plots as a late extra or catch crop

Panjáb—The notices regarding this pulse are so brief that the references already made under the paragraph of history (above) may be accepted as conveying all that is known

Central Provinces—A note obtained on this subject from Mr J B Fuller conveys the generally accepted opinion that it is a crop of the home-steads—grown during the rains in the small enclosures which surround the village houses

North West Provinces—Messrs Duthie and Fuller (*Field and Garden Crops*) give a brief account of this pulse They say there are

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several varieties of this climbing bean one of the more distinct being that named *D. purpureus*, a separate figure of which is given in *Plate XXXIV B*. Their chief distinguishing characters have reference to the colour of the flowers the shape and colour of the pods and the colour of the seeds. In these provinces these authors continue *sém* is commonly grown along the borders of tall crops and allowed to twine itself round the plants standing on the margin. The castor oil plant is a favourite support. It is also occasionally grown in little patches round houses and allowed to trail over the walls and roof. It is never grown as a field crop by itself since it would require an artificial support which would add too much to the cost. It is used as a vegetable its long pods picked in unripe condition forming a favourite addition to the daily mess of green food. It is seldom if ever grown for its grain. The reference to its climbing on the castor oil plant may be accepted as showing that it is a *rabi* or spring crop. Mr Atkinson says of Kumáon that there are six varieties commonly cultivated in gardens and very occasionally as a field crop.

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Bengal — The same remark as given under the Central is applicable to the Lower Provinces. It is not a regular agricultural crop though few huts exist without at least one plant trailing over the enclosure. The Director of Land Records and Agriculture says. Different varieties of *shim* or *lablab* distinguished from one another by colour size form nature of stripes &c of the pod are cultivated all over Bengal as a garden vegetable. A grass coloured small variety of very indifferent flavour is found wild in the jungle of Madhupur. The Rev A Campbell (a most painstaking observer) has furnished the writer with a complete set of all the cultivated and wild plants of a large portion of Chutia Nagpur. Of this pulse he says it is largely cultivated the legumes being eaten but he does not appear to have found the plant wild. Roxburgh however in his *Flora Indica* says. Of this species there are known to me five varieties viz a cultivated state and two wild. Of the two wild plants he calls the one *Ban shim* in Bengali and *Adavi chikurka* in Telugu. This he describes as smooth in every part and frequently biennial if not perennial. It is never cultivated nor any part of it used. Of his other wild form he says. It is found with the former wild in the hedges &c near Samulkota and differs from it in being very downy both have red flowers and dark grey mottled seeds. No part of these two varieties is made any use of. Under *Dolichos lignosus* Willd. he describes some six other cultivated beans. These by the *Flora of British India* have all been reduced to *D. Lablab* so that according to Roxburgh there are some thirteen forms of the plant. Of his cultivated forms under *D. Lablab* Roxburgh accepts that known as *Annapa* in Telugu as the most typical. He writes of it. The whole of this plant has a heavy disagreeable smell something like the green bug. It is much cultivated in the fields during the cold season and delights in a rich black soil which cannot be flooded by rains. Like *Bobra* it requires three months from the sowing till ripe yields in a good soil about forty fold. These seeds bear a low price compared to most other sorts of grain. They are much eaten by the poorer classes particularly when rice is dear. They are not palatable but reckoned wholesome substantial food. Cattle are also fed with the seeds and they are remarkably fond of the straw. It is said to make cows yield much milk. Of the other forms of *D. Lablab* Roxburgh seems to convey the idea that they are garden products and not field crops. Under *D. lignosus* he writes. I include under the above definition many varieties some of them hitherto deemed distinct species. All are cultivated during the cold season in the gardens and about the doors of the natives forming not only cool, shady arbours but furnishing them with an excellent

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(G Watt)

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Lablab**

pulse for their curries &c in the tender legumes In short these and the four last mentioned cultivated varieties of *Lablab* may be called the *Kidney Beans of the Asiatics*

Assam—The Director of Land Records and Agriculture furnishes the following note regarding *Dolichos Lablab*, *urohi*. The *urshi* or *ursi* he says is a creeper producing beans and is grown in almost every village It is nowhere grown as a field crop but is grown on lands adjoining homesteads which are called *chara* lands The greater portion is grown for home consumption and a very small part only finds its way to the markets for sale There are five kinds of *Urohi*—(1) *Kamtal* (2) *Dorika* (3) *Rojala* (purple) (4) *Ranga* (red) and (5) *Boga* (white) Of these the first produces the biggest beans about 10 inches long and $1\frac{1}{4}$ inches broad and the fifth kind produces the smallest beans about 3 inches long and 1 inch broad The bean of the *dorika urohi* is not flat like the four other kinds but round about 4 to 5 inches in length and about $1\frac{1}{4}$ inches in diameter The third fourth and fifth kinds have obtained their names on account of the colour of the beans they produce These creepers are grown only in vegetable gardens in *basti* lands The seeds are sown in August close to a hedge or large tree The crop is gathered from November to January and the plants die in the hot weather The natives eat the beans either boiled or fried or use them in curry with fish About 45 seers of pods are obtained from each plant a year and the average price is six pice a seer Not unfrequently the seeds are dried and kept In this state they last long and are eaten after being ground and cooked like pulses also in curries Cattle are never fed on them The beans have some medicinal properties The juice is mixed with salt and applied in inflammation of the ear and throat &c due to cold The roots are used for poisoning wild animals

It may be pointed out that the round podded plant described above according to the botanical definition cannot be a form of *Dolichos Lablab* but is more probably *Vigna Catuanga* and a specimen of *Urohi* sent from Assam to the writer some years ago proved to be *Vigna Catuanga* The pod of *Dolichos Lablab* as described in the *Flora of British India* is said to be flat linear or oblong recurved 2—4 seeded and $1\frac{1}{4}$ to 2 inches long by $\frac{1}{4}$ to $\frac{3}{4}$ inches broad tipped with the hooked persistent base of the style The possibility of a mistake may be accepted as a justification for doubting the propriety of dealing with these plants collectively the more so since Assam by the above report would stand by itself in the record of periods of sowing and reaping The writer may add however that he is personally acquainted with *Dolichos Lablab*, as met with in Assam and he collected a sample of it even in the Naga hills there known as *kechu* This latter fact is of very considerable interest since till recently these mountain tracts have been completely closed to visitors from the lower neighbouring tracts The names given to the plant by the Angami Nagas and Assamese are therefore in all probability purely indigenous and would point to a probable independent cultivation from the wild stock of the plant by the hill tribes on the eastern side of India that is to say independent of the cultivation in the southern and central table land of India

Burma—Mason in his *Burma and Its People* (pp 466 768) says 'The Burmese and Karens grow several varieties of one or two species of *lablab* which occupy the place of kidney beans in Europe Reverting to this on a further page he speaks of wild *Dolichos*, the *tau bai* this is *Vigna pilosa* of modern botanists In a recent official communication on the subject of *Dolichos Lablab* cultivation in Burma it is stated that in the Kyaukpnyu District it is sown in the latter part of the rains and bears in the cold weather It is grown on well raised manured soil and

CULTIVATION**ASSAM
800****BURMA
801**

**DOLOMÆA
macrocephala****The Sim or Asiatic Bean****AREA
802**

when about a foot high it is allowed to twine round bamboo trellis work'

AREA OF CULTIVATION

It is difficult if not impossible to discover the area under a crop which like the present, exists as a garden climber each peasant having one or two plants. It is grown all over India becoming less abundant towards the north than in the southern and western divisions of the country. In Madras and Bombay however it is to some extent a field crop. In Madras in 1885-86 there were stated to have been 65 664 acres under the crop in 1886-87 78 700 acres and in 1887-88 35 724 acres. In Bombay the area appears to be greater. In 1885-86 72 660 acres in 1886-87 91 652 and in 1887-88 95 188 acres.

The Madras returns for 1887-88 may however be incorrect since ambiguity often exists through the figures of area appearing under different names such as beans, *avarī*, *mochai* or *anumulu* &c.

**CHEMISTRY
803**

Chemical Composition.—In his *Food Grains of India* Professor Church publishes the results of five analyses of this pulse. He accepts the fourth as fully expressing the character of the grain. The following abstract from the Professor's table of analysis may be here given —

Composition of Lablab Beans

	In 100 parts		In 1 lb	
	Husked (3)	With husk (4)	Oz	Gr
Water	12.1	12.1	1	410
Albuminoids	24.4	22.4	3	255
Starch	57.8	54.2	8	394
Oil	1.5	1.4	0	98
Fibre	1.2	6.5	1	17
Ash	3.0	3.4	0	238

From these figures the Professor concludes that the nutrient ratio deduced from analysis (4) is 1 : 2.5 the nutrient value is 80. It will be seen however on comparing the several analyses given above that the percentage of albuminoids is rather variable. The extreme range is probably not more than 6 per cent. Of the numerous forms of *Lablab* the majority are eaten as a green vegetable. The concluding sentence is of importance since, to judge of the value of this plant as a source of human food, the green pods would have to be analysed.

Food and Fodder.—The extensive series of quotations from numerous writers given above will it is believed have conveyed the main facts regarding the GREEN PODS as a vegetable, the RIPE SEEDS as a pulse eaten by certain classes or employed as cattle food, and of the STEMS as constituting a valued fodder. It is only necessary to repeat these points here in order to establish, in their proper places, the numbers to be assigned to these products.

Medicine.—The only record of this plant being used for medicinal purposes is that published above in the paragraph of cultivation in Assam.

Domestic Uses.—The root are said to be used in Assam to poison wild animals. This is a remarkable fact since the whole plant has hitherto been supposed to be wholesome.

Dolichos sinensis, Linn. ; see *Vigna Catjang* Endl. **LEGUMINOSÆ**

D. uniflorus, Lam. see *Dolichos biflorus* Linn.

Dolomæa macrocephala, DC. see *Jurinea macrocephala*, Benth., **COMPOSITÆ**

D 808

**FOOD and
FODDER**
Green Pods
804
Ripe seeds
805
Stems
806
MEDICINE
807
DOMESTIC.
Roots
808

DOMESTIC AND SACRED

809

Under this heading the reader may have observed in each article (e.g. **Bambusa**) a paragraph describing the minor economic objects that could not be treated of as Gums Dyes Tans Fibres Oils Medicines Foods or Timbers. It is proposed to give in the Appendix to this work a collective article for each of these classes of products. The intention is that these collective articles should not serve as keys only to the descriptive accounts (distributed throughout the Dictionary) but prove useful if possible in arranging specimens in Museums. Many of the articles dealt with under the paragraph heading Domestic and Sacred have already to some extent however been summarised in the bulk of the work. Thus for example lists of timbers suitable for definite purposes have been given in the alphabetical positions of their uses (e.g. **Cabinet work**). The article "**Beads**" enumerates all the animal vegetable and mineral substances used as beads and the article **Detergents** gives the materials employed in place of soap in washing garments or cleansing the hair and the teeth. But the detailed article on Domestic and Sacred Products would afford the key by which these special lists might be discovered and at the same time it would indicate the writer's ideas of classification—ideas which have of necessity influenced him in dealing with the minor economic articles which in the absence of a better title he has designated Domestic and Sacred Products.

DOREMA, Don Gen Pl I 918**Dorema Ammoniacum, Don ; UMBELLIFERE**RESIN
810

The Eastern Giant Fennel (a native of Persia) is supposed to afford at least some portion of the Gum resin *Ammoniacum* (the *Ushak* in Persian and Arabic the *Kandal* in Bokhara) which is largely imported into India. The plant is said by Aitchison to occur in the Harirud valley. He writes of it "No sooner is the fruit well formed and beginning to ripen than the plant is attacked by some boring insect which causes the milky juice to escape. This dries into hard blocks frequently enclosing the fruit. The *Kandal Ushak* or *Ammoniacum* is usually collected from the stem and fruitescence and often encloses clusters of the fruit."

Dorema Ammoniacum is alluded to by many writers on Indian Economic Products among whom the following may be mentioned—*Stewart Panjáb Pl* 106 *R H Irvine Mat Med Patna pp* 80 84 *Dymock Mat Med West India 2nd Ed p* 392 *Atkinson Gums and Gum resins p* 28 *Report on the Gums and Resins of India issued by the P W D* 13 26 60 *Indian Forester XIII* 91 93 *XIV* 369 *Watt's Cat Econ Prod shown at the Calcutta Exh'b Parts I No* 124 *IV, No* 126 *V No* 472

DORONICUM, Linn Gen Pl, II, 440**Doronicum Falconeri, Clarke Fl Br Ind III, 333 ; COMPOSITE**

811

Habitat—A stout herb 1 1½ feet high and nearly leafless above found in Kashmir altitude 13 000 and in Western Tibet 14 000 feet

D Hookeri, Clarke Fl Br Ind III 332

812

Syn—*D SCORPIOIDES, Clarke Composita Ind, 169 in part*

Habitat.—A robust herb 1 2 feet high, found in Sikkim (Lachim and Tungu) altitude 12 000 to 14 000 feet

D 812

DRACOCEPHALUM
moldavicum

The Akrahi

813

Doronicum Roylei, DC Fl Br Ind, III 332**Syn** —FULLAROMIA KUMAONENSIS DC**Vern** —*Darunaj akrahi* Pb *Darunaj akrahi* PERS**References** —*Dymock Mat Med W Ind 2nd Ed 442; S Arjun Bomb Drugs 77 Year Book Pharm 1880 248 Med Top Ajmir 133 Baden Powell Pb Pr 357 Atkinson Him Dist 312***Habitat.**—A herbaceous erect plant 2 to 4 feet high found on the Western Himálaya from Kashmír to Garhwál altitude 10 000 feetThis species is closely allied to the European plant **D Pardalanches L****MEDICINE**

Root

814

Medicine—The root is an aromatic tonic said to be used to prevent giddiness on ascending heights (*Baden Powell*) *Dymock* gives an account of the European drug **D Pardalanches Linn**, and states that there appears to be a demand for it since it is kept by all the Muham madan drug sellers in Bombay It is described by the author of the *Makhsan el Adwiyah* as a scorpioid knotted root with greyish exterior and white interior hard faintly bitter and aromatic Is said to be found in Andulasia and the mountainous parts of Syria especially about Mount Yabrurat where it is known by the name of *Akrahi* With regard to its medicinal properties he says that it is a resolvent of phlegm adust bile and flatulencies cardiacal and tonic useful in nervous depression melan choly and impaired digestion also in pain of the womb and flatulent dyspepsia**Dr Dymock** from whom the facts given above have been compiled in his *Materia Medica* adds Besides this it is prescribed for persons who have been bitten by scorpions and other venomous reptiles and is hung up in houses to keep away the plague pregnant women wear it round the waist suspended by a silken thread which must be made by the wearer it is supposed to act as a charm protecting the fœtus and procuring a painless delivery Hung up over the bed it prevents night terrors and ensures pleasant dreams **Dr Dymock** under the heading *Chemical Composition* discusses the properties of *Inulin* the starch equivalent present in the *COMPOSITÆ* but gives no special properties to the roots of this plant It would appear from the virtues attributed to the drug that its reputation depends more on the theory of signatures than to any ascertained properties Should a greater demand arise for it it is probable that either of the Indian forms mentioned above might be substituted for the imported root**DRACOCEPHALUM, Linn Gen Pl, II 1199**

[LABIATÆ

815

Dracocephalum heterophyllum, Benth Fl Br Ind, IV, 665**Vern** —*Zanda shanku, karamm* N PB & LADAK**Reference** —*Stewart Pb Pl 168***Habitat**—A brittle herb with obtusely angled branches Found in the Panjáb Himálaya and Ladak from 13 000 to 17 000 feet**Food and Fodder**—The plant is browsed by goats and sheep and its root appears to be used as a vegetable (*Stewart*)**FOOD AND FODDER**
Plant and Root.

816

817

D moldavicum, Linn; Fl Br Ind, IV, 665**Vern** —*Tukhm ferunymishk* HIND**Habitat**—A glabrous small herb found in the western temperate Himálaya and Kashmír at altitudes of 7 000 to 8 000 feet**Medicine.**—*Irvine (Mat Med Patna p 125)* says the SEEDS are used ground up in fevers and as demulcent dose ʒii to ʒj in infusion**MEDICINE**

Seeds

818

D 818

Dragon's Blood (G Watt)	DREGEA volubilis.
Dracocephalum Royleanum, Wall , see Lallemantia Royleana, Bth , [LABIATÆ]	
<p data-bbox="268 300 722 327">DRACÆNA, Linn Gen Pl III, 779</p> <p data-bbox="156 335 840 561">A genus of trees or shrubs belonging to the Natural Order LILIACÆ. Very little of an economic interest has been recorded regarding the Indian species. Kurz describes eight species as met with in Burma D angustifolia, Roxb being there known as <i>Kwam lin nek</i> (or <i>kunlinnet</i>). Roxburgh gives nine species of which two are natives of Sylhet viz D ternifolia, Roxb the <i>bun amtol</i> and D atropurpurea, Roxb the <i>lall-bun amtol</i>. Many Indian writers allude to the species of this genus more especially the ornamental garden forms now so extensively grown. Baker (<i>Linnean Soc Jour XIV 525-538</i>) describes 38 species met with in the world of which only four are natives of India with one or two forms reduced to varieties which were formerly treated as separate species. The Indian species are —</p> <ol style="list-style-type: none"> 1 Dracæna angustifolia, Roxb — A native of the lower Himalāya ascending to 6 000 feet and distributed to the Khāsia Hills Assam Sylhet Burma &c 2 D atropurpurea Roxb — A native of Sylhet the Khāsia Hills and Chittagong ascending to 3 000 feet. This has three varieties. 3 D elliptica Thunb — Met with in Sylhet and the Andaman Islands 4 D spicata Roxb — A native of the Himalāya ascending to 3 000 feet but distributed to Bombay the Nilgiri Hills and Andaman Islands <p data-bbox="140 730 873 796">The only known economic product obtained from Dracæna is the DRAGON'S BLOOD said to be obtained from D Draco, also from D schizantha and D Cinnabari</p> <p data-bbox="173 796 722 822">See Calamus Draco, Vol II, Nos 69-73, pp 17 to 19.</p>	<p data-bbox="929 300 968 327">819</p> <p data-bbox="907 730 991 789">Dragon's Blood 820</p>
<p data-bbox="235 839 744 865">DRACONTIUM, Linn Gen Pl, III 995</p> <p data-bbox="117 882 873 931">Dracontium polyphyllum, Linn Engler in DC, Mon Phaner, Vol II, 283 AROIDEÆ</p> <p data-bbox="207 941 856 982">Vern — <i>Sevali</i> BOMB <i>Jangli suran</i> GUZ ; <i>Caat karnay kaloung</i> TAM <i>Adivie kunda gudda</i> TEL <i>Kanana canda</i> SANS</p> <p data-bbox="140 987 873 1077">Habitat — Met with on the Malabar Hills Bombay and the Concan. The writer is disposed to regard this as a mistake some other plant being meant since D polyphyllum is not a native of India, though frequently met with under cultivation</p> <p data-bbox="140 1077 873 1192">Medicine — The root is large rugged and irregular and supposed to possess antispasmodic virtues and to be a remedy in asthma. It is also used in hæmorrhoids. According to Thunberg it is highly esteemed in Japan as a powerful emmenagogue and sometimes used to procure abortion (<i>Ainslie</i>)</p> <p data-bbox="140 1192 868 1239">Special Opinion — \$ Good medicine for chronic diarrhœa ' (<i>V Um megudien Mettapollian Madras</i>)</p>	<p data-bbox="929 882 968 908">821</p> <p data-bbox="896 1077 991 1136">MEDICINE Root 822</p>
Dragon's Blood, see Calamus Draco and Dracæna above	
<p data-bbox="274 1283 700 1310">DREGEA, Meyer Gen Pl, II, 775</p> <p data-bbox="711 1321 868 1348">[ASCLEPIADÆÆ]</p> <p data-bbox="114 1348 868 1374">Dregea volubilis, Benth Wight Ic t 586 Fl Br Ind, IV 46 ;</p> <p data-bbox="207 1374 812 1400">Syn — <i>Hoya viridiflora</i> R Br <i>Asclepias volubilis</i> Linn f</p> <p data-bbox="207 1400 868 1500">Vern — <i>Nak chhikni</i> HIND <i>Tit kunga tita kunga</i> BENG <i>Marang kongat</i> SANTAL <i>Dodhi</i> BOMB, <i>Hirandodi harandori khandodi</i> MAR <i>Kodic-palay cwingi kirai</i> TAM <i>Dudi-palla</i> TEL <i>Gwaytanhpin</i> BURM ; <i>Kiri anguna</i> SING <i>Madhu malati</i> (according to <i>Ainslie</i>) SANS</p>	<p data-bbox="929 1341 968 1367">823</p>

DRIMYCARPUS
racemosus**Dregea—an Emetic and Expectorant**

References.—*Roxb Fl Ind Ed C B C* 253 *Thwaites En Ceylon Pl*, 199 *Dals & Gibs Bomb Fl* 153 *Campbell's Econ Prod Chhutta Nagpur No* 9250; *Grah Cat Bomb Pl* 119, *Griff Ic Pl Asiat t* 387 388; *Pharm Ind* 143 *Ainslie Mat Ind II*, 154 *O Shaughnessy Beng Dispens* 454 *Moodeen Sheriff Supp Pharm Ind* 155 *Dymock Mat Med W Ind 2nd Ed* 524, *S Arjun Bomb Drugs* 201 *Irvine Mat Med Patna* 74 *Lisboa U Pl Bomb* 201 233 *Royle Fib Pl* 306 *Home Dept Cor regarding Pharm of Ind* 239 *Indian Forester III* 237

Habitat—A stout tall climbing shrub of Bengal Assam, the Deccan Peninsula from the Concan southward to Ceylon

Fibre—Contains an exceedingly strong **FIBRE** which is extracted by the natives The *Rev A Campbell* says that in Chutia Nagpur the Brahmans sometimes make their *porta* or sacred threads from this plant *Lisboa* says that in Bombay the creeper is used as a substitute for **ROPE** to tie up bundles of firewood

Medicine—The **LEAVES** are much employed as an application to boils and abscesses The **ROOTS** and tender **STALKS** are considered emetic and expectorant *Ainslie* tells us that the *Vytians* suppose the root and tender stalks to possess virtues in dropsical cases they sicken and excite expectation though I could not obtain much information of a certain nature respecting them it is to be presumed that they operate in a manner somewhat similar to the root of *Asclepias Curassavica*, which according to *Browne* in his *Natural History of Jamaica* the Negroes use as a vomit The *Pharmacopæia of India* after alluding to the value of the leaves as an external application adds According to native testimony it has the same emetic and expectorant virtues as *Dæmia extensa* *Irvine (Mat Med Patna)* says this drug is used in colds and eye diseases to cause sneezing dose gr 1 to $\frac{1}{2}$ drachm *Dr Dymock* repeats the above information but adds that all parts of the **POLLICLES** are intensely bitter and that the brown **MEALY SUBSTANCE** that covers them is given in Bombay to cattle as a medicine

Special Opinions—§ The tender end of the creeper with its **JUICE** when touched into the nose causes excessive sneezing This remedy is commonly used by Hindus to make sick people sneeze (*V Umme gudien Mettapollian Madras*)

Food—*Ainslie* while alluding to the report that the **LEAVES** are eaten as a green vegetable doubts the accuracy of this opinion because of their nauseate reputation Many subsequent writers however affirm that they are regularly eaten Thus *Thwaites* says they are eaten in Ceylon and *Lisboa* says of Bombay the leaves are used as a vegetable

DREPANOCARPUS, *Mey Gen Pl I* 546

According to the *Genera Plantarum* there are only eight species belonging to this genus and these are all American The chief characters as established by the *Genera Plantarum* in the separation of this genus from *Dalbergia* are the versatile anthers and lunate to reniform pod These characters according to *Kurz* are possessed by three Burmese trees viz *Drepanocarpus Cumingii* *D monospermus*, *D reniformis*, and *D spinosus* Following the usual course pursued in this work however of accepting the synonymy of the *Flora of British India* these have been dealt with under *Dalbergia*, which see

DRIMYCARPUS, *Hook f Gen Pl, I*, 424

Drimycarpus racemosus, *Hook f, Fl Br Ind, II* 36 **ANA**
[CARDIACEÆ]

D 834**FIBRE**

824

Rope

825

MEDICINE

Leaves.

826

Roots

827

Stalks

828

POLLICLES.

829

MEALY

Substance

830

Juice

831

FOOD

Leaves

832

833

834

Drosera—Insectivorous herbs

(G Watt)

DROSERA
peltata.**Syn**—*HOLIGARNA RACEMOSA* Roxb *Fl Ind II* 82**Vern**—*Telsur* BENG *Amdali* ASSAM *Amjour* SYLHET *Kagi* NEPAL;
Brong kung LEPCHA *Chengane sangai* Bru *sangryn* MAGH**References**—*Kurs For Fl Burm I* 314 *Gamble Man Timb* 112;
Cat Trees Shrubs &c of Darjeeling 25**Habitat**.—A large evergreen tree of the Eastern Himalaya from 2,000 to 6 000 feet the Khasia Hills and Sylhet to Chittagong and Pegu**Structure of the Wood**—Greyish yellow hard close-grained Used occasionally in Assam for canoes and planking in Chittagong for boats for which it is one of the woods most employed Major Lewin says that boats 50 feet long and 9 feet in girth are sometimes cut out of logs of this woodTIMBER.
835DROSERA, Linn *Gen Pl I* 662

There are three species of this genus of small annual insectivorous herbs found in India of which *Drosera Burmanni* Vahl (found throughout the plains and ascending the hills to 4 000 feet) is the most abundant and resembles closest the European Sun Dew *D indica* Linn is a very minute species with obovate leaves met with on Patnath in Chutia Nagpur and distributed outwards through the Deccan to Burma and Ceylon while *D peltata* is a tall species with peltate leaves arranged along an erect stem It is found on the Himalaya from 4 000 to 10 000 feet and also in the Nilgiri Hills

It seems probable that what little economic information exists regarding these plants is fairly applicable to any one or to all the species Writers on *Drosera* generally allude to *D peltata* however but it is perhaps safe to relegate the statements made regarding the Gangetic plains to the first species alone and regarding the Himalaya to the last

Drosera Burmanni, Vahl *Fl Br Ind, II* 424 DROSERACEÆ

836

Vern—*Mukha jali* HIND**References**—*Stewart Pb Pl* 20 *Kanara Gasetteer (XV I)* 433
Indian Forester II 24 *VIII* 405 *Mason's Burma and Its People*
436 749 *Atkinson Him Dist* 310 735 *Drury U Pl* 118

Habitat—Found throughout India plentiful in the Gangetic plains appearing on the paddy fields in the cold season It is everywhere seen in Chutia Nagpur and Orissa and is common in fields around Burdwan although not met with in the vicinity of Calcutta From Behar it passes through the Central Provinces to the Deccan is very common in Kanara and extends south to the Madras Presidency appearing on the lower hills and also in Burma It prefers a sandy open soil

D peltata, Sm *Fl Br Ind II*, 424

837

Vern—*Chitra* PB**References**—See above

Habitat—There are two forms of this plant the type being found in Moulmein The form known as *lunata* occurs throughout the Himalaya and on the Nilgiri Hills It is nowhere however met with on the plains

Dye—Drury suggests that a dye may be prepared either from *D Burmanni* or *D peltata* as Royle mentions the fact of the paper which contained his dried specimens being saturated with a red tinge

Medicine—It seems probable that both the above species are referred to under the vernacular name of *Mukha jali* The LEAVES of this curious and insectivorous plant bruised and mixed with salt are used as a blister in Kumáon This same practice prevails however in Kanáwar without the use of salt All the members of this family have a bitter, acrid, and caustic flavour If placed in milk they rapidly curdle it

Fodder—Cattle will not touch any species of *Drosera*DYE
838
MEDICINE
Leaves.
839FODDER.
840

DUCKS, &c

Ducks, Teals, Geese, and Swans

Drugs, see Medicines

DRYOBALANOPS, *Gärtn*, *Gen Pl I* 191

841

Dryobalanops Camphora, *Coleb*, DIPTEROCARPEÆ

BARUS CAMPHOR

See Vol II, No 259, pp 84-93

DUABANGA, *Ham* *Gen Pl I*, 783

84

Duabanga sonneratioides, *Ham Fl Br Ind II*, 579 [LYTHRACEÆ]

Syn — LAGERSTROMIA GRANDIFLORA Roxb

Vern — Bandorhulla BENG Baichua CHITTAGONG SANTAL Kochan
kokan ASSAM Bondorkella achung bolchim GARO, Jarul jhalna
CACHAR Lampatia NEPAL Dur LEPCHA Baichua MAGH Myouk
gnau myan kngo BURMReferences — Roxb *Fl Ind Fd C B C* 404, *Kurz For Fl Burm I*
525 *Gamble Man Timb* 204 *Cat Trees, Shrubs, &c Darjeeling* 42,
Indian Forester I 88 99 *IV* 345 *VII* 101 *IX* 377 *XI* 255 315
XII 286 453

Habitat — A lofty deciduous tree with light brown bark peeling off in thin flakes, a native of Nepal and Eastern Bengal (ascending to 3,000 feet) Assam Chittagong and Burma

TIMBER.
843

Structure of the Wood — Grey often streaked with yellow soft seasons well takes a good polish and neither warps nor splits Weight 30lb per cubic foot Canoes cut out of it green are at once used even when liable alternately to wet and the heat of the sun In Northern Bengal and Assam it is now very extensively used for tea boxes for which purpose it is admirably fitted It is also made into cattle troughs and other ordinary domestic utensils It came into use for tea boxes in 1874 75 when Toon wood became scarce The seeds are small but germinate freely so that for planters this is one of the most useful of trees

Tea-boxes
844
Cattle
troughs
845

846

DUCKS, TEALS, GEESE, AND SWANS

The large and very important assemblage of Indian birds which may be accepted as represented by the Duck the Goose and the Swan constitutes one of the best marked sections of the Order Natatores of Zoologists They are characterised by a more or less perfect state of web foot by having short compressed tarsi and a flattened bill In the Goose and the Swan the bill is pointed has a sharp nail like hook on the tip and ascends towards the base In the Ducks and Teal the bill is nearly of one breadth throughout and quite flat with well-developed lateral laminations which are employed in sifting the water in the search for food

The following are the chief edible birds of the above assemblage, met with in India —

847

1. *Anas boscas* — The Mallard

This is universally regarded as the best Indian Duck for the table being followed in point of merit by the Pintail and after that the Gadwall The Mallard is a comparatively speaking common species, though less so on the western side of the continent

848

2. *A. caryophyllacea* — The Pink headed Duck

849

3. *A. pectorhynga* — The Indian spotted bill Duck

850

4. *Anser albifrons* — The White-fronted or Laughing Goose

D 850

Ducks, Teal, Geese, and Swans	(G Watt)	DUGONG oil
5 A cinereus —The Grey Goose or Lag		851
6 A indicus —The Barred headed Goose		852
7 Casarca rutila.—The Ruddy Sheldrake or Brahmani Duck		853
8 Chaulelasmus strepera —The Gadwall (see note above under No 1)		854
9. C angustirostris —The Marbled Teal		855
10 Clangula glaucion —The Golden eye or Garrot		856
11 Cygnus olor —The White or Mute Swan		857
12 Dafila acuta —The Pintail (see note above under No 1)		858
13 Dendrocygna fulva —The Large Whistling Teal		859
14 D javanica.—The Whistling Teal or Duck		860
15 Fulgula cristata —The Tufted Pochard		861
16. F marila.—The Scaup Pochard		862
17 F myroca —The White-eyed Pochard or Ferruginous Duck		863
18 F rufina —The Red-crested Pochard		864
19 Mareca penelope —The Wigeon		865
20 Mergellus albellus —The Smew		866
21 Mergus castor —The Gossander		867
22 M serrator —The Red breasted Merganser		868
23 Querquedula circa.—The Garganey or Blue-winged Teal		869
24 Q crecca —The common Indian Teal		870
This is universally eaten and one of the commonest birds offered for sale in the market places of large towns		871
25 Q formosa —The Clucking Teal		872
26 Sarkidiornis melanonotus —The Comb Duck		873
27 Spatula clypeata.—The Shoveller		874
28 Tadorna cornuta —The Shell drake or Burrow Duck		
Though all of the above birds may be eaten at most only three or four can be said to be regular articles of trade. Indeed after the domesticated duck the common teal is perhaps the most important. Their feathers are not articles of trade (see Feathers on a further page)		
In the Gazetteers of India frequent reference occurs to the domesticated Duck and Goose and to the above wild species. The reader is referred to Hume and Marshall's Game Birds of India for the wild birds and to the Bombay Gazetteers and other such publications for the domesticated especially Vols II 41 III, 19 IV 29 V 36 VI 17 VII 45 VIII 106 XI 33 XII 33 XV Pt I 81 XVI 21 XVII, 39 XXI 68 XXII 41. It is perhaps unnecessary to quote the volumes of the other Gazetteers and District Manuals as the information is of a very similar character to that which will be found in the volumes cited. In some parts of the country special houses (Tealeries) are constructed for the purpose of rearing Teal but the supply of the wild birds is mainly derived by a wholesale system of trapping. The consumption of the domesticated birds must be very great since by some classes of the Native population precluded from eating the barn door fowl there exists no injunction against the Duck		
Dugong oil, or the oil of the SEA HOG —the YUNGAN or MOODA HOORA		875
There are two species each yielding an oil highly valued in medicine and for cookery. One of the species Halucore indicus is distributed throughout the Indian Ocean in the Gulf of Manaar on the west coast of Ceylon in the Straits Settlements and the Eastern Archipelago. The other species H australis is found on the Australian coasts.		
Oil —On boiling down each animal (weighing from 4 to 6 cwts) yields from 6 to 14 gallons of oil. The oil has no unpleasant flavour, it is free from odour when refined it is clear and limpid. It is largely used as a substitute for cod liver oil (<i>Spons Encyclop</i>)		

DYERA lasiflora.	The Durian or Civet-cat Fruit
	<p>Dulcamara, see <i>Solanum Dulcamara</i> Linn SOLANACEÆ</p> <p>Dunchi Fibre, see <i>Sesbania aculeata</i>, Pers LEGUMINOSÆ</p> <p>Durian, see <i>Durio Zibethinus</i>, DC</p> <p style="text-align: center;">DURIO, Linn Gen Pl, I, 213</p> <p>876 Durio Zibethinus, DC, Fl Br Ind I 351 MALVACEÆ</p> <p style="text-align: center;">DURIAN OR CIVET CAT FRUIT TREE</p> <p>Vern — <i>Durian</i> MALAY <i>Duyin</i> BURM</p> <p>References — <i>Linschoten Voyage to the East Indies in 1596</i>, Vol II pp 34 51 53 68 <i>Burma Gazetteer</i> Vol I 420 <i>Burma Gazetteer</i> by Major Macneill p 230 <i>Mason Burma and Its People</i> 447 and 754; <i>Annual Report of the Settlement of Port Blair for 1870 71</i> pp 33 40; <i>Kew Off Guide to Bot Gardens and Arboretum</i> 67</p> <p>Habitat — A large tree of the Malay Islands wild in South Tenasserim and cultivated as far north as Moulmein The large flowered form viewed by many botanists as the wild condition is by the <i>Flora of British India</i> treated as a different species under the name of D malaccensis, Planch</p> <p>Food — Produces a large FRUIT 10 inches by 7 called the <i>Durian</i> or civet cat fruit of which the cream coloured fleshy aril or pulp enveloping the seeds like that of the Jack fruit is the part eaten It is well known and much prized but eaten by Natives only It has a strong odour considered by Europeans as highly offensive which resembles that of putrid animal matter combined with rotten onions The fruit is however highly prized even by Europeans when once the prejudice to the smell is overcome The Burmans regard it as extremely luscious and it forms a considerable part of their food The roasted seeds and the boiled unripe fruit are also eaten as vegetables John Huyghen van Linschoten's description of this fruit might be read as if written recently instead of 300 years ago In his time it was perhaps as extensively cultivated as at the present The Kings of Burma used to import large supplies of the fruit indeed it constituted a by no means unimportant article of traffic from Lower to Upper Burma</p> <p>The <i>Dorian</i> is regarded with peculiar favour by the natives and also European residents in the country Colonel Biggs writes thus about it It is so rich and highly flavoured that it resembles marrow rather than fruit and is subject when ripe to speedy decomposition when its odour becomes disagreeable a circumstance which has made it disliked by some who have not been able to eat the fruit fresh from the tree it is beyond question the finest fruit in the world (<i>Burma Gazetteer</i> written by Major Macneill)</p> <p style="text-align: center;">DYERA, Hook f Linn Soc Jour, XIX</p> <p>880 Dyera costulata, Hook f, Fl Br Ind, III 644, APOCYNACEÆ</p> <p>881 D lasiflora, Hook f</p> <p>Sir J D Hooker in the <i>Linnæan Society's Journal</i> Vol XIX p 293, gives a brief history of these plants while founding the new genus to which they are referred a genus named in honour of Mr W T Thiselton Dyer, O M G. Director of the Royal Botanic Gardens Kew</p> <p>D costulata was first collected by Griffith in Malacca and has since been re collected both in Malacca and in Sumatra D lasiflora seems confined to Singapore</p>

A useful Timber used for Canoes

(G Watt)

DYSOXYLUM
procerum

These interesting trees have been shown to be the source of the *Gutta jelutong* of commerce See under *Dichopsis*—GUTTA PERCHA

GUTTA-
PERCHA.
882**DYES AND TANS**

883

For a detailed account of the Dyes and Tans of India see the Appendix to this work also consult the Note under Domestic and Sacred Products above

DYSOXYLUM, Bl Gen Pl I 332, 994

[MELIACEÆ

Dysoxylum binectariferum, Hook f Fl Br Ind, I, 546,

884

Syn—D MACROCARPUM Thwaites GUAREA BINECTARIFERA Roxb G
GOTADHORA Buch Ham

Vern—Rata HIND Borogatothara ASSAM Rangrata CACHAR Ka
tongau LEPCHA Yerinda BOMB

References—Roxb Fl Ind Ed C B C 319 Kurz For Fl Burm
I 215, Beddome Fl Sylva t 150 Gamble Man Timb 71, Cat
Trees Shrubs &c Darjiling 16 Grah Cat Bomb Pl 31 Lisboa
U Pl Bomb 42 Indian Forester IX 607

Habitat—An evergreen tree of Sikkim (ascending to 2 000 feet) of
Assam the Khásia Hills Chittagong and the Western Ghâts

Structure of the Wood—Reddish grey rough and close-grained hard
weight 44lb a cubic foot This timber seems worthy of notice

TIMBER.
885**D Hamiltonii, Heirn Fl Br Ind I 548**

886

Vern—Bolashin GARO Gendelli poma bosuniya poma (Wall) ASSAM
Bau iphal NEPAL

References—Gamble Man Timb 72 Indian Forester III 21 IV,
292 V III 29

Habitat—A large evergreen tree of the Darjeeling Terai Assam and
Sylhet

Structure of the Wood—Red hard close grained weight 40lb a
cubic foot Used in Assam for boats and planks said not to be durable
Hamilton mentions that it is used for canoes

TIMBER
887
Canoes.
888
889**D procerum, Heirn Fl Br Ind I, 547**

Vern—Dingori govorpongyota (Wall) ASSAM

References—Kurz, For Fl Burm I 214 Gamble Man Timb 71
Indian Forester IV 292

Habitat—An evergreen tree of Assam the Khásia Hills and Cachar to
Pegu and Tenasserim also met with in Sikkim and the Western Duars

Structure of the Wood—Bright red moderately hard handsome and
well deserving of more extensive notice weight 37 to 40lb a cubic foot
It is said by Hamilton to be used for canoes

TIMBER.
890
Canoes
891

ECHIUM

(7 F Duthie)

The Gaozabán

E

Eagle-wood, see *Aquilaria Agallocha*, Roxb Vol I, p 279.

Earthen-ware, Clays used for see Vol II, p 364.

Earth-nut, see *Arachis hypogæa*, Linn, Vol I, p 282

Earths, see Soils

Ebony, see *Diospyros Ebenum*, Koenig III p 138

ECBALLIUM, Rich, Gen Pl, I, 826

I

Ecballium Elaterium, A Rich CUCURBITACEÆ

THE SQUIRTING CUCUMBER

MEDICINE
Fruit.

A native of South Europe The FRUIT yields the *Elaterium* of commerce which is a very powerful hydragogue cathartic Dr Dymock says that it does not appear to be known in Hindu medicine but that the Arabs and Persians are well acquainted with it The fruit is sold in Bombay under the name of *kateri-indráyan* and is imported from Persia

2

ECHINOCARPUS, Blume Gen Pl I 239

3

Echinocarpus dasycarpus, Bth, Fl Br Ind, I, 400, TILIACEÆ

Vern — *Gobria* NEPALReferences — *Gamble Man Timb 56 Ind For I 95*

Habitat — A large tree of the Eastern Himálaya from 5 to 7 000 feet

Structure of the Wood — Greyish brown soft used for planking for tea boxes and for making charcoal It is in considerable demand in Darjiling (*Gamble*)

TIMBER

4

Tea-boxes

5

ECHIUM, Linn, Gen Pl, II, 863

MEDICINE
Leaves.
Flowers.

6

Echium sp ? BORAGINÆÆ

Under the above name Dr Moodeen Sheriff in *Supp Pharm Ind 133* and Dr Dymock in his *Mat Med W India 2nd Ed 571* have described the well known bazar drugs *Gaozabán* and *Gul i gaozaban* Considerable confusion exists in the literature of this subject for not only is it probable that the products of entirely different plants are sold in the bazars as *gao sabán* but the correct botanical determination of the true *gao sabán* is still doubtful Moodeen Sheriff sent a specimen so named to Kew some years ago and it was determined as a species of *Echium* Stewart regarded the leaves of *Onosma echinoides* as the *gao sabán* of the Panjáb and in this opinion he has been followed by Atkinson Murray & Royle in his *Illustrations of the Himalayan Botany* p 304 says that

Onosma bracteatum is called *gao sabán* or ox tongue and has *fughulus* and *buglusun* assigned as its Greek names Sir W O'Shaughnessy (*Beng Disp 420 495*) regarded *Cacalia Kleinia* (COMPOSITÆ) — a synonym for *Notonia grandiflora* — as the true *gao sabán* of the Indian physicians and pronounced the drug obtained from *Onosma bracteatum* as useless But he describes his *Cacalia* as prickly which it is not and thus leaves room for a grave doubt as to the accuracy of his determination He specially mentions that the drug is prized in Bombay while Dymock neither gives *Notonia* (*Cacalia*) *grandiflora* the name of *gao sabán* nor attributes to it the properties of that drug Birdwood wrote All Indian authorities refer *gao-sabán* to the above plant (*C Kleinia*), but the *gao sabán* of the bazars is also derived from *Anisomeles malabarica*, R Br LABIATÆ *Trichodesma indicum*, Br *Heliotropium ophioglossum*, Stocks and *Onosma bracteatum*, Wall BORAGINÆÆ " Lastly Dr Aitchison, in his report on

The Gaozabán, the Kesuri

(7 F Duthse)

ECLIPTA
alba.

the Botany of the Afghán Delimitation Commission gives *gao seban* as the vernacular name for *Caccinia glauca* Savt (BORAGINÆ). Turning to Boissier's *Flora Orientalis* for a detailed description of that plant it is found to agree admirably with the flowers and leaves sold in the Indian bazars which will be found fully described by Dymock under *Echium*. Boissier gives the synonym *Caccinia Celsii* which it may be suggested by a clerical error might be the origin of O Shaughnessy's *Cacalia Kleinia*. *Caccinia glauca* is a fairly abundant plant in Quetta and in Gilgit but neither Mr Lace nor Dr Giles seem to have recorded its vernacular name as *gao zaban*. On the whole therefore it appears tolerably certain that the true *gao zaban* of Indian bazars is derived from one or more species belonging to the Borage family. See *Onosma bracteatum*. (For the above note on *Echium* the Editor is responsible and regrets that it was omitted to be described under *Caccinia glauca*, which would appear to be the true source of the *gao zaban*.)

ECLIPTA, Linn, Gen Pl II 361

Eclipta alba, Hassk Fl Br Ind III, 304 COMPOSITÆ

7

Syn — E. ERECTA Linn E. PROSTRATA Linn

Vern — *Moch kand bhangra babri* HIND Kesuti *keysuria keshwari kesaraya*, BENG Kesarda URIYA Lál kesari SANTAL Tík SIND; *Máka bhringurája* MAR; *Bhángra kaluganthi dodhak* GUJ *Karisha langanni karkeshi kavishilái* TAM *Galagara guntakála gara guntá galyeru* TEL *Gavagada sappu kadigga garaga* KAN *Kikurindi* SING *Kesarája* SANS *Kadim-el bint* ARAB

Dr Udoy Chand Dutt in his *Materia Medica* page 181 says that the Bengali and Hindi vernacular names *kesaraya bhanrá* as also the Sanskrit name *bhringaraja* are indiscriminately applied to this plant and to *Wedelia calendulacea*, Linn. This was not the case in Roxburgh's time *kesuri* being *Eclipta alba* and *bangra* or *kesaraja* (*pivala mákád pivalá bhangra* MAR) *Wedelia calendulacea*, which see

References — Roxb Fl Ind Ed C B C 605; Thwaites En Ceylon Pl 164 Dals & Gibs Bomb Fl 127 Stewart Pb Pl 126 Aitchison Cat Pb and Sind Pl 75 Rheede Hort Mal X t 41 Trimen Hort Zeyl 45 Elliot Fl Andhr 57 66 Rev A Campbell Econ Prod Chutia Nagpur 9 Pharm Ind 128 U C Dutt Mat Med Hind 181 Dymock Mat Med W Ind 2nd Ed 430 S Arjun Bomb Drugs 77 Murray Pl and Drugs Sind 181 Bidie Cat Raw Pr Paris Fxh 32 Med Top Ajmir 126 Baden Powell Pb Pr 358 Atkinson Him Dist 735, Drury U Pl 180 Lisboa U Pl Bomb 162 260 292 Balfour Cyclop I 1027 Home Dept Cor 221 238

Habitat — An erect or prostrate weed, abundant throughout India ascending to 6000 feet on the Himálaya

Dye — There is a popular opinion that the HERB taken internally and applied externally will turn the hair black (Dymock). In tattooing the natives after puncturing the skin rub the juicy green leaves of this plant over the part which gives the desired indelible colour viz a deep bluish black (Roxburgh)

SPECIAL OPINIONS — § Dr Kanni Lal De writes 'The practice prevails in Bengal of anointing the heads of infants with the juice of the fresh plant (Eclipta) to cause apparent greyish hair to become black. This is repeated once or twice the hair being shaved'. Dr De does not regard it as having any virtue in permanently changing the colour of the hair

Eclipta is here used for tattooing. I have never seen *Wedelia* used (Dr W Dymock Bombay). "*Eclipta prostrata*, var *erecta*" is used on this side of India for imparting a bluish black dye not the other plant, which is called *pivala* (yellow) *bhangra*' (Assistant Surgeon Sakharam Arjun Ravat L M, Gurgaum Bombay)

DYE
Herb
8

**EHRETIA
acuminata****Edgeworthia—Nepal Paper****MEDICINE****Yellow kind**
9**Juice**
10**Fresh Plant**
11
Roots
12**Leaves**
13
Root
14

Medicine.—It is an old established Hindu medicine principally used as a tonic and deobstruent in hepatic and splenic enlargements and in various chronic skin diseases in the latter case it is also pounded and applied externally. The **YELLOW KIND** *peela bhangra* described by the author of the *Makhsan el Adwiya* is *Wedelia calendulacea*, and according to Dutt is the kind mostly used in Bengal. Mr Wood considers that the plant will be found eventually of greater service than *Taraxacum* in hepatic derangements. The expressed **JUICE** is recommended in the Pharmacopœia of India as the best form of administration. In Bombay the natives use the juice in combination with aromatics such as *ajowan* seeds as a tonic and deobstruent and give two drops of it with eight drops of honey to new born children suffering from catarrh. It also forms an ingredient of a remedy used in the Concan for tetanus (*Dymock*). The **FRESH PLANT** mixed with Sesamum oil is applied externally in elephantiasis. Murray writes that in Sind the expressed juice of the **ROOTS** is employed as an emetic. It is also purgative. The Rev A Campbell states that in Chutia Nagpur the root is applied in conjunctivitis and galled necks in cattle.

SPECIAL OPINIONS—§ The juice of the **LEAVES** is given in one tea spoon ful doses in jaundice and fevers. The **ROOT** is given to relieve scaling of the urine in doses of 180 grains mixed with salt. (*C T Peters M B Zandra South Afghanistan*). It is anodyne and absorbent and relieves headache when applied with a little oil. It is an excellent substitute for *Taraxacum*. (*Kanni Lal De Bahadur*)

Eddoes, see *Colocasia antiquorum* Schott, Vol II, p 509

EDGEWORTHIA, Meissn Gen Pl III 193[**LEACEÆ****15****Edgeworthia Gardneri, Meissn Fl Br Ind, V, 195; THYMÆ****Vern**—*Kaghut aryali* NEPAL**References**—*Brandis For Fl 386 Gamble Man Timb 314*

Habitat—A large elegant bush almost leafless when covered with its clusters of yellow sweet scented flowers. Found along the Himalaya from Nepal to Sikkim and Bhutan between 4000 and 9000 feet altitude and recently met with plentifully on the mountains of Manipur extending to the northern frontier of Burma.

Fibre—The strong tough fibre obtained from the long straight sparsely branched **TWIGS** of this bush must sooner or later become one of the most valuable of Indian fibres. The finest qualities of **NEPAL PAPER** are made from this plant which produces a whiter paper than that obtained from *Daphne cannabina* Wall. The chemistry of *Edgeworthia* fibre and the probable extent to which it is used in Nepal paper making will be found discussed under *Daphne cannabina* Wall Vol III 20.

Structure of the Wood—Grey light soft with little lustre (*Gamble*)

Edible Birds nests, see *Collocalia nidifica* Vol II, p 504

Egg plant, see *Solanum Melongena*, Linn

EHRETIA, Linn Gen Pl, II, 840**20****Ehretia acuminata, Br, Fl Br Ind, IV, 141, BORAGINÆ****Syn**—*E serrata* Roxb

Vern—*Pányan punlawai panden, koda kurkuna arjun* HIND; *Kula aja* BENG *Bual* ASSAM *Nalshuna chillay* NEPAL *Puna* N W INDIA; *Narra* GARHWAL *Shaursi* KUMAON *Punna parsan* *halthaun sum* PB *Punra* PUSHTU *Rend, KURKU; Ridi* BAIGAS.

The Ehretia.	(F F Duthse)	EHRETIA lævis.
References —Roxb <i>Fl Ind Ed C B C</i> 200 Voigt <i>Hort Sub Cal</i> 445 Brandis <i>For Fl</i> 339 Kurz <i>For Fl Burm I</i> 210 Gamble <i>Man Timb</i> 272 Stewart <i>Pb Pl</i> 154 Aitchison, <i>Cat Pb and Sind Pl</i> 93 Atkinson <i>Him Dist</i> 314 Econ <i>Prod N W P Pt V</i> 81 Drury <i>U Pl</i> 190 Balfour <i>Cyclop I</i> 1034 <i>Treasury of Bot</i> 442		
Habitat —A medium sized tree found in the Sub Himáláyan tract and outer Himáláyan ranges from the Indus to Sikkim ascending occasionally to 5 500 feet		
Food —It yields an insipidly sweet FRUIT which is eaten the unripe fruit is pickled		FOOD Fruit. 21
Structure of the Wood —Light brown, with white specks fairly even and compact soft not heavy easily worked made into scabbards sword hilts gun stocks and employed in building and for agricultural implements Not durable (Brandis)		TIMBER. 22
Ehretia buxifolia, Roxb Fl Br Ind IV 144		23
Vern —Pála HIND Pale DEC Pála BOMB, Kuruvingi TAM Bapana buri patta-pisinniki TEL Hin tambala SING		
References —Roxb <i>Fl Ind Ed C B C</i> 201 Voigt <i>Hort Sub Cal</i> 446 Beddome <i>For Man</i> 167 Gamble <i>Man Timb</i> 272 Thwaites <i>En Ceylon Pl</i> 214 Dals & Gibs <i>Bomb Fl Suppl</i> 60 Trimen <i>Hort Zeyl</i> 54 Filhot <i>Fl Andhr</i> 23 154 Dymock <i>Mai Med W Ind 2nd Ed</i> 576 Bidie <i>Cat Raw Pr Paris Exh</i> , 36 Drury <i>U Pl</i> 190 Balfour <i>Cycl p I</i> 1033		
Habitat —A shrub found in the dry jungles of the Deccan Peninsula also in the Malaya		
Medicine —Ainslie describes the ROOT as sweet and slightly pungent when fresh It is used as an alterative in syphilis Muhammadans regard it as an antidote to vegetable poisons		MEDICINE Root 24
E lævis, Roxb Fl Br Ind IV, 141 Wight, Ic t 1382		25
Vern —Chamráv chamrur koda darur datranga HIND; Tamboli BENG Mosonea URIYA Dotti dasti gilchi GOND Tambol (Banda) BUNDEL Chumbul SIND Tamboli BOMB Datranga MAR Pála dantam pedda pulimera seregad siragadam addabukkudu TEL Kappura avak KAN		
References —Roxb <i>Fl Ind Fd C B C</i> 201 Voigt <i>Hort Sub Cal</i> 445 Brandis <i>For Fl</i> 340 Kurz <i>For Fl Burm II</i> 210 Beddome <i>Fl Sylv t</i> 246 Gamble <i>Man Timb</i> 272 Thwaites <i>En Ceylon Pl</i> 214 Dals & Gibs <i>Bomb Fl</i> 170 Aitchison <i>Cat Pb and Sind Pl</i> 93 Filhot <i>Fl Andhr</i> 109 142, 150 168 Baden Powell <i>Pb Pr</i> 578 (E aspera) Atkinson <i>Him Dist</i> 314 Econ <i>Prod N W P Part V</i> 81 Lisboa <i>U Pl Bomb</i> 202 Balfour <i>Cyclop I</i> 1034		
Habitat —A moderate-sized tree common throughout India		
Food —The FRUIT is tasteless, but is eaten as also the inner BARK during famine times		FOOD Fruit. 26
Fodder —The LEAVES are used as cattle fodder		Bark. 27
Structure of the Wood —Wood greyish white hard tough and durable used for building purposes and for agricultural implements		FODDER. Leaves, 28
In the <i>Flora of Brit India</i> the following varieties are enumerated — Var floribunda (Brand <i>For Fl</i> 340) <i>Syn E floribunda, Benth in Royle Ill</i> 306 Leaves acuminate softly pubescent and ciliate It occurs from Behar to the Panjab extending into Afghanistan		TIMBER 29
Var pubescens <i>Syn E pubescens, Benth in Royle Ill</i> , 306 Branchlets hairy as well as the leaves Throughout India		VARIETIES. 30
Var tumorensis Malaya to Australia		31
Var canarensis is distinguished by the symmetric strong nerved leaves, and is the <i>Ehretia</i> usually found on the Nilghiris and other Deccan mountains		32 33

**ELÆAGNUS
hortensis****Oleaster or Bohemian Olive****VARIETIES****34**

Var aspera, Syn *E aspera*, Roxb *Fl Ind Ed CBC* 201 *Brandis For Fl* 340 *Beddome For Man* 166 *Kurz For Fl Burm II*, 209 This variety appears to be confined to Eastern Bengal and is distinguished by its small obtuse leaves which are hairy beneath when mature

35**Ehretia, obtusifolia Hochst Fl Br Ind IV 142**

Vern—*Chamror* (Panjáb Plains) *gín* (Rávi) *chamar* (Bias) *sakkur*, *dhiman saggar ganger bari kander* (Salt Range) *chambal* (Sind Sagar Doab) *marag iune kharawune khabarra tutiri lor* PUSHIU

References—*Brandis For Fl* 340 *Gamble Man Timb* 272 *Stewart Pb Pl* 153 (*E aspera*) *Dymock Mat Med W Ind 2nd Ed* 576

Habitat—A small shrub resembling *E lævis*, *var aspera* and confined to Sind Rájputána and the Panjáb

Medicine—A decoction of the fresh ROOT is used in venereal diseases (*Dymock*)

Structure of the Wood—Resembles that of *E lævis*

MEDICINE

Root

36**TIMBER****37****38****E Wallichiana, H f & T T, Fl Br Ind, IV, 143**

Vern—*Bari dowari* NEPAL *Kalet* LEPCHA

Reference—*Gamble Man Timb* 272

Habitat—A large tree frequent in Sikkim and Bhután from 2 000 to 7 000 feet also on the Khásia mountains

Structure of the Wood—Grey and moderately hard it is used for building and for charcoal and occasionally for tea boxes (*Gamble*)

TIMBER**39****ELÆAGNUS, Linn Gen Pl III 204**

A genus containing about a dozen species remarkable for the abundance of delicate silvery or brown scales with which the leaves and stems are coated. The tint of the foliage and the form of the fruit of some of the species give them a striking resemblance to the olive tree hence the generic name

40**Elæagnus hortensis, M Beib, Fl Br Ind V 201 ELÆAGNÆ**

OLEASTER, BOHEMIAN OLIVE JERUSALEM WILLOW *Eng*;

OLIVIER DE BOHEME *Fr*; WILDE OFLBAUME *Germ*

Syn.—*E ANGUSTIFOLIA* Linn and *E ORIENTALIS* Linn

Vern—*Sirshing sirshing* TIBET *Shiulik* N W P *Sanyt santj san jata* AFGH *Zin seid* (fruit) PERS

References—*Brandis For Fl* 389 *Irvine Mat Med Patna* 124 *Royle Ill Him Bot* 323 *Balfour Cyclop I* 1035

Habitat—A small deciduous tree bearing sweet scented flowers found on the Western Himálaya and in Tibet up to 10 500 feet and extending westward to Spain

Gum—According to *Stocks* a transparent brown and white gum, similar to Gum arabic exudes from wounds in the bark

Medicine—The FLOWERS are reported to be medicinal

Food—The acid BERRIES are largely eaten in Tibet Baluchistan and Afghanistan and the tree is cultivated to some extent for that purpose. The dried berries are known under the name of Trebizond dates, and are occasionally made into cakes by the Arabs. In Yarkand a spirit is distilled from these berries

Fodder—Mr J H Lacey states that in the autumn in Baluchistan the LEAVES are given as fodder to sheep and goats

Structure of the Wood—Sap-wood narrow heart wood dark brown porous soft, used for fuel

Domestic Uses—Dr Stewart in the manuscript copy of his *Forest Flora* states that in Ladak the roots of this plant are used as fuses for match locks

GUM**41****MEDICINE**

Flowers

42**FOOD**

Berries

43**FODDER.**

Leaves.

44**TIMBER****45****DOMESTIC****46**

Fuses.

47**E 47**

Utrasum Bead Tree (♀ F Duthse)

ELÆOCARPUS lanceæfolius

Elæagnus latifolia, Linn ; *Fl Br Ind*, V, 202 ; *Wight, Ic*, t 1856

48

Syn — *E CONFERTA* Roxb *E ARBOREA*, Roxb

Vern — *Guara* BENG *Kamboong* MAGH *Sheu shong* (E *arbores*, Roxb) GARO HILLS *Jarila* NEPAL, *Ghiwain*, *myhauila*, KUMAON, *Nagri ambgul* BOMB *Wel-embilla* SING

References — *Roxb Fl Ind*, Ed C B C 148 *Voigt Hort Sub Cal*, 304 *Brandis For Fl* 390 t 46 *Kurz For Fl Burm*, II 331 *Beddome Fl Sylv* t 180 *Gamble Man Timb* 317 *Thwaites En Ceylon Pl* 252 (Excl Syn *parvifolia*) *Dals & Gibs Bomb Fl* 224 *Trimen Hort Zeyl Atkinson Him Dist* 316 *Fcon Prod N W P Part V* 82 *Gas Simla District* 12 *Gas Bomb XV* 441

Habitat — A small evergreen tree or shrub often scantend widely distributed throughout the hilly parts of India on the Himálaya it occurs westward of Jaunsar up to 9 000 feet also in Burma Penang South India and Ceylon

Food — The acid somewhat astringent FRUIT is eaten Dr Mason says that it makes excellent tarts and jellies and is a great favourite with the natives in Burma The Conservator of Forests Northern Circle Madras states that the fruit of this plant which is very common on the Nilghiri Hills is eaten chiefly by tenders of cattle it does not constitute however an article of trade

Structure of the Wood — Resembles that of *E hortensis*

E umbellata, Thunb *Fl Br Ind*, V 201

Syn. — *E PARVIFOLIA* Wall

Vern — *Ghwadin ghain kankols kankol mirch bammewa* PB

References — *Brandis For Fl* 391 *Gamble Man Timb* 318 *Baden Powell Pb Pr* 373 (under *E orientalis*) 578 under (*E conferta*) *Atkinson Him Dist* 736 *Royle Ill Him Bot* 323 t 81 f 1

Habitat — A deciduous-leaved often thorny shrub of the temperate Himálaya extending from Kashmir to Nepál at 3 000 to 10 000 feet also in China and Japan

Medicine — The SEEDS and FLOWERS (*gul i sanjad*) are said to be used as a stimulant in coughs and the expressed OIL in pulmonary affections The flowers are also given as a cardiac and astringent *Baden Powell* says that the seeds are used to adulterate black pepper

Food — The FRUIT is pickled like olives or eaten in curries

Structure of the Wood — White hard even grained, but warps on seasoning (*Gamble*)

FOOD
Fruit.
49

TIMBER
50
51

ELÆOCARPUS, Linn ; *Gen Pl* I 239 [66, TILIACEÆ

Elæocarpus Ganitrus, Roxb *Fl Br Ind*, I, 400 *Wight Ic*, t

UTRASUM BFAD TREE Eng

Vern — *Rudrik* HIND *Rudrakya* BENG *Rudraksh* MAR *Rudra kas* TAM *Rudra challu* TEL *Rudraksha* SANS

References — *Roxb Fl Ind* Ed C B C 433 *Voigt Hort Sub Cal* 123 *Brandis For Fl* 43 *Kurz or Fl Burm* I 168 *Beddome For Man* 38 *Dals & Gibs Bomb Fl* 27 *Lisboa U Pl Bomb* 286 *Balfour Cyclop* I, 1035 *Treasury of Bot* I 444

Habitat — A large tree found in Nepál Assam and the Concan gháts

Domestic Uses — The hard tubercled nuts are polished made into rosaries and bracelets worn by Brahmins (Shivas) and fakirs and are frequently set in gold They are mostly imported from Singapore where the tree is common See the article *Beads*, Vol I, p. 431

E lanceæfolius, Roxb *Fl Br Ind*, I, 402 ; *Wight, Ic*, t 65

Syn — *E LANCEOLATUS* Wall

MEDICINE
Seeds.
52
Flowers.
53
Oil
54
FOOD
Fruit.
55

TIMBER
56
57

DOMESTIC
58

59

ELÆOCARPUS
Varunna**The Jalpai and Rudrak**

		Vern — <i>Sakalang</i> ASSAM <i>Sufed pai</i> SYLHET <i>Bhadras batrachs</i> NEPAL <i>Shephyew</i> LEPCHA
		References — <i>Roxb Fl Ind Ed C B C</i> 435 <i>Voigt Hort Sub Cal</i> 123 <i>Kurs For Fl Burm I</i> 169 <i>Gamble Man Timb</i> 57
		Habitat — A large tree of the Eastern Himalaya from 6 000 to 8 000 feet the Khasia Hills Sylhet and Tenasserim also in Kanara
		Food — The FRUIT which ripens in September and October is eaten by the natives
FOOD Fruit. 60		Structure of the Wood — Light brown and soft it is used for house building tea boxes and charcoal
TIMBER. 61		Domestic Uses — The seeds of this tree are used for a similar purpose as those of <i>E Ganitrus</i> See <i>Beads</i> , Vol I p 431
DOMESTIC 62		Elæocarpus oblongus , <i>Gertn Fl Br Ind I</i> 403 <i>Wight Ic t</i> 46
63		Vern — <i>Bikki</i> NILGHIRIS
		References — <i>Beddome For Man</i> 38 <i>Gamble Man Timb</i> 57 <i>Dals & Gibs Bomb Fl</i> 7
		Habitat — A large tree found in Southern India and in Burma
TIMBER. 64		Structure of the Wood — White strong and tough, and adapted for the lathe (<i>Beddome</i>)
65		E robustus , <i>Roxb Fl Br Ind I</i> , 402; <i>Wight Ic t</i> 64
		Vern — <i>Chekio</i> MAGH <i>Jalpai</i> SYLHET <i>Bepari batrachs</i> NEPAL <i>Chekio</i> MAGH <i>Taumagye</i> BURM
		References — <i>Roxb Fl Ind Ed C B C</i> 434 <i>Voigt Hort Sub Cal</i> 123 <i>Kurs For Fl Burm I</i> 169 <i>Gamble Man Timb</i> 57
		Habitat — An evergreen tree of the Eastern Himalaya ascending to 2 000 feet the Khasia Hills Eastern Bengal Chittagong Burma and the Andaman Islands
TIMBER 66		Structure of the Wood — White shining soft even grained
67		E serratus , <i>Linn Fl Br Ind I</i> 401
		Syn — <i>E PIRINGARA</i> Wall
		Vern — <i>Jalpai</i> BENG <i>Perinkara</i> KAN <i>Weralu</i> SING
		References — <i>Roxb Fl Ind Ed C B C</i> 434 <i>Voigt Hort Sub Cal</i> 123 <i>Brandis For Fl</i> 43 <i>Beddome For Man</i> 38 <i>Gamble Man Timb</i> 57 <i>Ihwaites In Ceylon Pl</i> 32 <i>Trimen Hort Zeyl</i> 12 <i>Buchanan Statistics of Dnarpur</i> 153 <i>Taylor Topography of Dacca</i> 50
		Habitat — A tree found in the north east regions of the Himalaya in Bengal and on the western coast also in Ceylon
		Food — The fleshy outer portion of the FRUIT is eaten in curries by the natives and is also pickled in oil and salt like olives In Assam the tree is occasionally grown for the sake of the fruit which is eaten either ripe or unripe and boiled with vegetables to give them an acid flavour
FOOD Fruit 68		E tuberculatus , <i>Roxb Fl Br Ind I</i> , 404 <i>Wight, Ic, t</i> 62
69		Syn — <i>E SERRULATUS</i> <i>Roxb</i>
		Vern — <i>Rudrak</i> HIND <i>Rudrak</i> KAN
		References — <i>Roxb Fl Ind Ed C B C</i> 433 <i>Beddome Fl Sylv t</i> 113 <i>Dals & Gibs Bomb Fl</i> 27 <i>Lisboa U Pl Bomb</i> 287 <i>Balfour Cyclop I</i> 1037
		Habitat — A large handsome tree found in South India, and in Burma
		Domestic Use — The nuts of this tree are used in the same way as those of <i>E Ganitrus</i> See <i>Beads</i> , Vol I, p 432
DOMESTIC 70		E Varunna , <i>Ham Fl Br Ind I</i> 407
71		Vern — <i>Tutteah</i> saul kuri ASSAM
		References — <i>Kurs For Fl Burm I</i> 165 <i>Gamble Man Timb</i> 57
		E 71

The Jumarasi Gum

(*J. Duthse*)

ELEMI GUM

Habitat—A tree met with in the Hímálaya from Kumaon to Sikkim, also in Assam and Chittagong

Food—Like the other species this also produces a FRUIT which is edible

ELÆODENDRON, Jacq f Gen Pl I 367

Elæodendron glaucum, Pers Fl Br Ind I 623 CELASTRINÆ

Syn—E PANICULATUM W & A E ROXBURGHII W & A
NEERIJA DICHOTOMA Roxb

Vern—*Miri* thanks KOL *Neouri neuri* SANTAL *Chikyeng* LEPCHA
Dhakka nisur GOND *Mamri* BUNDEL *Bakra jamuwa chauli*
daberi mamri, N W P *Chairi metkur* OUDH *Shauriya* KUMAON
Mirandu padriun bakra jamo mir goo [Husharpur] PB *Niru*
MELGHAT *Jimrasi mamri* BANDA *Bata karas* BHIL *Jamrasi jum*
ras i kala mukha rohi C I *Niru KURKU* Aran *tamruj bhukas*
BOMB *Burkas* KONKAN *A an tamr i thuta pila* MAK *Bhutrah*
shi HYDERABAD *karkara irkili selupa siri* TAM *Nirju bira*
neriya manu nerasi nirasi neradi botanskam kanemi bootigi TEI
Tha maraju KAN *Bra* MADRAS *Bhutapulu chutaya t maruja*
nerrelu pieri SING

References—Roxb Fl Ind Ed C B C 214 & 217 Voigt Hort Sub
Cal 167 Brandis For Fl 82 Beidome Fl Sylv t 148 For Man
67 Gamble Man 1mb 87 Thwaites E Ceylon Pl 73 Dals &
Gibbs Bomb Fl 48 Grah Cat Bomb Pl 38 Elliot Fl Andhr 27
133 135 Stewart Pb Pl 40 Atchison Cat Pb and Sind Pl 32
O Shaughnessy Beng Dispens 271 Dymock Mat Med W Ind 2nd
Ed 179 S A Jun Bomb Drigs 30 Kev A Campbell Cat Econ
Prod Chutia Nagpur p 17 Atkins n Him Dist 736 Urur, U Pl
190 Lisboa U Pl Bomb 49 264 274 Coke Gums and Gum resins
16 Atkins n Gm and Gum-resins 15 Balf ur Cyclop I 1036
Treasury of Bot I 444 For Adm Report Chutia Nagpur 1885 29
Bomb Gaz XV 68

Habitat—A moderate sized tree or occasionally only a shrub occur
ring throughout the hotter parts of India and in Ceylon Along the outer
Hímálaya it ascends to 6 000 feet

Gum—It is supposed to yield the gum called *Jumarasi* which occurs
in roundish tears about $\frac{1}{2}$ inch in diameter rough or cracked on the sur
face It is tasteless and forms a sherry coloured solution with water

Medicine—The root is a specific against snakebite and Sir Walter
Elliot speaks highly of this property The BARK is used in native medi
cine and is said to be a virulent poison A decoction or cold infusion of
the fresh bark of the root is applied to swellings

Roxburgh states that the fresh bark of the root rubbed with water is
by natives applied externally to remove swellings According to Sakha
ram Arjun the LEAVES (*bhutapála*) dried and powdered act as a sternu
tatory and are used as a fumigatory to rouse women from hysterical
fits A snuff of the leaves is also employed to relieve headache

Structure of the Wood—Moderately hard even and close-grained
works and polishes well light brown often with a red tinge the outer
wood white but no distinct sap wood no annual rings It is often beauti
fully curled and flaked It is used for cabinet work combs and picture
frames It is also employed for fuel in the Konkans

Elaterium, see *Ecballium*

Elderflowers, see *Sambucus nigra*, Linn

Elemi Gum There is considerable doubt as to the plant or plants from
which this substance is obtained It seems to be a member of the
BURSERACEÆ It is generally supposed to be a species of *ICICA* of
AMYRIS or of CANARIUM (It should not be confounded with *Animi* for
which see *Copal*)

FOOD
Fruit
72
73

GUM
74

MEDICINE
Root
75
Bark
70

Leaves.
77

TIMBER.
78

ELEPHAS
indicus

The Indian Elephant.

Elephant apple, see *Feronia elephantum*, *Correa* below

ELEPHANTOPUS, *Linn Gen Pl, II, 237*

80

Elephantopus scaber, *Linn ; Fl Br Ind III 242 Wight Ic*,
PRICKLY LEAVED ELEPHANT'S FOOT *Eng [t 1086; COMPOSITÆ*
Vern—*Gobbi samdulun* HIND *Goyalata shamdulun* BENG *Manjur*
juts SANTAL; *Hastipata* BOMB *Anashovadi* TAM *Eddu málíko-*
chettu (bullock's tongue shaped leaves) *hasti kasaka enuga bira* TEL
Ká too-pin ma too-pin BURM *At addeya et adi* SING *Goythbá go*
ghwa SANS

References—*Roxb Fl Ind Ed C B C 607 Voigt Hort Sub Cal*
406 Dals & Gibs Bomb Fl 122 Rheede Hort al X t 7
Trimen Hort Zeyl 44; U C Dutt Mat Med Hind 208 Dymock
Mat Med W Ind 423 Balfour Cyclop I 1041 Treasury of Bot
I 446

Habitat—A stiff hairy herb with wrinkled crenate radical leaves distributed throughout the hotter parts of India

Medicine—*Rheede* says that a decoction of the ROOT and LEAVES is given on the Malabar coast in cases of dysuria. In Travancore the natives are reported to boil the bruised leaves with rice and give them internally for swellings or pains in the stomach. The Rev A Campbell states that in Chutia Nagpur a preparation from the root is given for fever

Elephant's foot, see *Elephantopus scaber*, *Linn*

ELEPHAS

(George Watt)

83

Elephas indicus, *Cuv , Jerdon Mam Ind, 229*

THE INDIAN ELEPHANT *ELEPHANTES It , FIEL, Scand ,*
ELEPHANTE Sp , FIL, Turkish

Vern—*Hati* or *káthi* *guy pil* HIND *Gaj* BENG *Ani* or *anay* TAM
TEL *KAN* and *MAL Yenu* GOND *Pil* PUSHTU *Hastr* *gaja*
SANS *Feel* PERS *Alha* SING *Shanh hsen* BURM *Gadjah*
MALAYAN

Mukna is a tuskless male elephant tame females used in hunting are called *kunkies*

In the *Rig Veda* the elephant is mentioned once or twice under the name of *Mikrohasi* (the beast with a hand) and in the *Atharvan* he is exalted as the mightiest and most magnificent of animals. But there is little in early Sanskrit literature to justify the inference that the elephant was then domesticated. The word *Elephant* is supposed by some to have been derived from *Pilu* in Sanskrit and *Fel* in Persian which with the Arabic article *El* became *el fil* and *Elephas* in Greek. The Hindu god of wisdom *Ganesh* has the body of a man with the head of an elephant.

References—*Natural History of Indian Mammalia* by *Sterndale 389*
Thirteen Years among the Wild Beasts of India by *G P Sanderson*
pp 48 to 4 Through Masai Land by *Joseph Thomson 537 The*
Natural History of Ceylon by *Sir Emerson Tennent The Elephant* by *Lieut Ouchterlony The Management of Elephants* by *Col Hawkes*
(Ichrist—A Practical Treatise on the diseases of Elephants SLYMM
Treatise on the Treatment of Elephants in Health and Disease Sanderson
The Elephant in Freedom and Captivity—a lecture in the Journal
of the United Service Institute in India Various papers in the Quar-
terly Journal of Veterinary Science in India The Elephant by *J H*
Steel V S A V D The Kuram Field Force by *G A Oliphant*
Pack Gear of Elephants by *G P Sanderson John Huyghen van Lin-*
schoten Journal of Travels in India published in 1596 The Ain e Akbari
by Abul Fazi (Blochmann's Transl) pp 117 to 132 and 213 214, 235
284 379 467 and 618 C P Administration Report 1865-66 p 64 and
1866-67 p 91 Bombay Gazetteers Vols VIII (Kathisawar) 97 XII
(Khandesh) 29 XV Pt I (Kanara) 27 Madras Man Adm Vol II

MEDICINE
Root.
81
Leaves
82

The Indian Elephant.

(G Watt)

ELEPHAS indicus.

292 *Ain lie Mat Med* II 479 *My ore and Coorg Gasetteer* I 148
Falconer and Cauley Fauna Antiqua Silvalen is Balfour Cyclopa
dia of India 1037 *Encyclopædia Britannica VIII* 122 *Ure Diction*
ary Arts Manufactures &c II 760 *Spons Encyclopædia*

Where Found —Jerdon says The elephant is still tolerably common in most of the large forests of India from the foot of the Himálaya to the extreme south. It is found in the Terai from Bhután to Dehra Dun and the Kyarda Dun. It used not many years ago to occur in the Rájma hal hills and it abounds in many parts of Central India from Midnapore to Mandla and south nearly to the Godavari. On the west coast it is abundant in many localities from the extreme south of Travancore to north latitude 17 or 18 degrees all along the line of the Western Gháts, more especially on the Anamally hills (named from that circumstance) in the Coimbatore hills Wynaad the slopes of the Nilghiris Coorg and parts of Mysore and Kanara. The Shervroys and Colamallies and other detached ranges to the east have occasionally small herds. It is numerous in Ceylon and in Assam southwards to the Malaya Peninsula.

Sanderson expresses briefly the area over which elephants occur thus — The wild elephant abounds in most of the large forests of India from the foot of the Himálayas to the extreme south and throughout the peninsula to the east of the Bay of Bengal, *viz* Chittagong Burma and Siam. It is also numerous in Ceylon. There is only one species of elephant throughout these tracts. According to the *Ain i Akbari Blochmann's Translation* the Emperor Akbar drew his supplies from regions where the elephant rarely if at all now exists *eg* the Cubah of Agra in the jungles of Bayawan and Narwar as far as Barár in the Cubah of Iláhábád (Allah ábád) in the confines of Punnah in the Cubah of Malwah in the Cubah of Bihár &c &c Those caught near Punnah in Bundelkhand were regarded as the best.

Varieties and Races of Elephants —According to most writers there is but one species of elephant met with in Asia. Some authors however view the elephant of Ceylon as forming with that of the Sumatra one a distinct species (*Elephas sumatranus*). Jerdon says of this form The Sumatran Elephant has 20 pairs of ribs (the Indian has 19 and the African 21) and the laminae of the teeth are wider than in the Indian species. It is said to be of a more slender make and to be more remarkable for its intellectual development than the Indian. A belief in the superior intellectual powers of the Ceylon as compared with the Indian elephant seems to have prevailed at least for the past 300 years. John Huyghen van Linschoten thus wrote of Ceylon. It hath divers elephants which are accounted for the best in all India and it is by daylie experience found to be true that the elephant of all other places and countries being brought before them they honour and reverence these. Sanderson while holding that the Ceylon elephant is the same species as the Indian refers to the fact that the males are in the majority of cases tuskless. He writes It is difficult to imagine what can cause the vital difference of tusks and no tusks between the male elephant of Continental India and Ceylon. The climate may be said to be the same as also their food and I have not seen any theory advanced that seems at all well founded to account for their absence in the Ceylon elephant. As an external character the immensely larger ears of the African elephant distinguish it from the Indian. But even among the Indian elephants local peculiarities and characteristics have been recorded sufficient to justify the opinion that the elephant of Nepál should be regarded as a different race from that of Mysore just as the Mysore is different from that of Assam or of the Chittagong hill tracts. The Nepál elephant is reported to be small in

WHERE FOUND
84

RACES
85

(a) Ceylon
 (b) Indian

- 1 Nepal
- 2 Mysore
- 3 Bengal
- 4 Chittagong
- 5 Burma
- 6 Shan
- 7 Madras
- 8 Bombay
- 9 Central India
- 10 Central Provinces.

**ELEPHAS
indicus****The Indian Elephant****DOMESTI
CATED
BREEDS
86****Koomeriah
Dwasala
Meerga****Not heredi
tary charac
teristics
87****AKBAR S
CLASSIFI
CATION
88****1 Bhaddar
Pearl from
Elephant.****89****2 Mand
3 Mirg
4 Mir****White
Elephant
90**

stature and well adapted for life on the hills The Shán elephants are tall massive and handsome but like the Ceylon race are very frequently tuskless The Burmese elephant resembles more the Nepál animal in being as Captain Hood remarks more compact than those of Hindustan and superior for hill work carrying loads over steep places and across swamp or boggy ground and they are excellent for draught purposes Steel remarks of the Chittagong race that they are good all round and make the best *koonkies* the Assamese are large both tall and massive and excellent for hunting purposes

Speaking of the classification of elephants as adopted by the Natives of India from the standpoint of their appearance and utility Sanderson says Elephants are divided by Natives into three castes or breeds distinguished by their physical conformation these are termed in Bengal *Koomeriah Dwasala* and *Meerga* which terms may be considered to signify thoroughbred half bred and third class The term *Koomeriah* signifies royal or princely *Meerga* is probably a corruption of the Sanskrit *Mirga* a deer the light build and length of leg of this class of elephants suggesting the comparison *Dwasala* in Persian means two things or originals and in reference to the elephant signifies the blending of the first and third castes into the intermediate one Only animals possessing extreme divergence rank as *Koomeriahs* or *Meergas* and the points of these breeds (if they may be so called) do not amount to permanent or even hereditary variations Whole herds frequently consist of *Dwasalas* but never of *Koomeriahs* or *Meergas* alone these I have found occur respectively in the proportion of from 10 to 15 per cent amongst ordinary elephants Sanderson enumerates the characters of the *Koomeriahs* as follows barrel deep and of great girth legs short (especially the hind ones) and colossal the front pair convex on the front side from the development of muscles back straight and flat but sloping from shoulder to tail as an up standing elephant must be high in front head and chest massive neck thick and short trunk broad at the base and proportionately heavy throughout bump between the eyes prominent cheeks full the eye full bright and kindly hind quarters square and plump the skin rumpled thick inclining to folds at the root of the tail and soft If the face base of trunk and ears be blocked with cream coloured markings the animal's value is enhanced thereby The tail must be long but not touching the ground and well feathered

A pronounced *Meerga* is the opposite of these characters especially in possessing long legs and an arched back It is well suited for quick marching on account of its lighter weight and length of legs

The *Asin Akbari* gives the classification of elephants as recognised in Akbar's time into four classes viz (1) *Bhaddar*— It is well proportioned has an erect head a broad chest large ears a long tail and is bold and can bear fatigue They take out of his forehead an excrescence resembling a large pearl which they call in Hindi *Gaj manik* (Elephant's pearl) (2) *Mand* a large black form said to have an ungovernable temper (3) *Mirg* a lighter coloured animal and (4) *Mir* an animal with small head which obeys readily but is easily frightened

The so called white elephant held sacred in Burma is an albino condition Steel says its very name has become a synonym for something expensive useless and extraordinary yet we are assured that there is no such thing as a white elephant Archibald Forbes gives, in his *Glimpses Through the Cannon Smoke*, a humorous account of the sacred white elephant of Burma As a rule the pale-coloured form known as the white elephant is a sickly animal his legs being swollen at the joints and often covered with tumours The colour is at most a dirty grey, but the

The Indian Elephant

(G Witt)

ELEPHAS
indicus

skin underneath has often a pinkish colour seen more especially when the animal goes into the water

CAPTURE OF WILD ELEPHANTS

HERDS—The elephant is a gregarious and polygamous animal, living in herds the members of which are presumably all related to each other. Each male is specially attentive to a selected number of the females of the herd but in the question of supremacy the males often fight amongst themselves the conquerors expelling their antagonists from the herd. At night the males frequently leave the herd and wander into the fields at a little distance from the favourite haunt of the herd. From both these causes single male elephants are occasionally met with but according to Sanderson it is incorrect to view all solitary male elephants as rogues' discontented vicious deserters from the herd. Many males from a liking for solitude choose to separate themselves from the herd for a time if not completely. A herd consists of from 10 to 50 or more. Herds of 1000 such as are referred to in some of the older works do not appear to be known at the present day if they ever existed. The herds select localities for occupation during fixed seasons of the year and in grazing in their favourite forests they have regular runs or paths of communication which they almost invariably follow. These facts have suggested most of the methods of capture which are now and have for centuries been in use. In advancing from one locality to another the herd is usually conducted by a female. This as Sanderson explains appears to be in consequence of the desire to regulate the rate of movement by the weaker not the stronger members of the community. Many writers drawing upon a not unnatural imagination have pictured herds led by powerful tuskers. The author of the article Elephant in the *Encyclopaedia Britannica* thus alludes to the movements of a herd which he says marches under the guidance of a single leader whom they implicitly follow and whose safety when menaced they are eager to secure. Steel writes— herds of elephants (which are families their members presenting family traits) vary much in size sometimes consisting of even 100 individuals but generally more or less broken up. They make their way through trackless forests preceded by a female generally the largest and following mostly in Indian file. When fleeing from danger the female assiduously keeps the young in front of her. Herds which have been broken up re collect and if one herd has been disturbed even others will leave the place (*Young Shikarry*). The conformation and great weight of the animal specially adapt him for thus making a track through the jungle. The bull rambles much more than the cows but he always keeps the herd within reach and will often nobly cover the retreat of his cows. Sir Victor Brooke describes the herd from which he bagged the largest Indian tusks on record as follows— There were about eighty elephants in the herd. Towards the head of the procession was a noble bull with a pair of tusks such as are rarely seen now a days in India. Following him in direct line came a medley of elephants of lower degree—bulls cows and calves of every size some of the latter frolicking with comic glee and bundling in amongst the legs of their elders with the utmost confidence. It was truly a splendid sight and I really believe that while it lasted neither Colonel Hamilton nor I entertained any feeling but that of intense admiration and wonder. At length the great stream was well believed over and we were commencing to arrange our mode of attack when that hove in sight which called forth an ejaculation of astonishment from each one of us. Striding thoughtfully along in the rear of the herd many of the members of which were doubtless his children, and his children's children came a mighty bull

CAPTURE OF
WILD
ELEPHANTS
91

Herds of
1000
See p 217

Female
leader
See p 217

**ELEPHAS
indicus****The Indian Elephant****METHODS OF
CAPTURE**

- (a) Pits
92
(b) Deecooy
93
(c) Kheddah
94

the like of which neither my companion after many years of jungle experience nor the two Natives who were with us had ever seen before. But it was not merely the stature of the noble beast which astonished us for that though great, could not be considered unrivalled. It was the sight of his enormous tusks which projected like a long gleam of light into the grass through which he was slowly wending his way that held us rivetted to the spot.

METHODS OF CAPTURE—Taking advantage of the fact that these noble animals thus live in herds and frequent definite paths in the forests they are captured in various ways *viz* by digging pits into which they fall the mouths of which are covered over with a light frame work of boughs and leaves by driving them along one of their most frequented paths into an enclosure. The single elephants occasionally met with are also captured by means of tame females the riders disguising and screening themselves as much as possible and after having surrounded their prize the attendants slip off the tame elephants and secure the feet of their victim.

Sanderson (*Thirteen Years among the Wild Beasts of India* p 101) gives a spirited account of his early attempts in capturing herds by driving them into an enclosure (the *Kheddah*). He writes of Mysore in 1873. I knew nothing of elephant catching at the time nor had I any men at command who did. But I knew where there were plenty of elephants and I was well acquainted with their habits. Some of the Maharajah's *mahouts* who were amongst my following had been accustomed to catch single elephants with trained females and in pitfalls but they had never heard of any one attempting the capture of a whole herd. It was said that Hyder had made a trial a century before in the Kakankote jungles but had failed and had recorded his opinion that no one would ever succeed and his curse upon any one that attempted to do so on a stone still standing near the scene of his endeavours. Consequently all the true Mussulmans who were with me regarded the enterprise as hopeless—though they judiciously kept that opinion to themselves. **Mr Sanderson** then narrates the features of his system which may be briefly described as the surrounding of a favourite resort of elephants by certain preliminary works prior to the arrival of the elephants particularly the construction of a strong *kheddah* protected by a trench. When these preparations have been completed the arrival of the elephants is awaited but on their arrival some 300 men are rapidly assembled and the elephants frightened by the noise made by these beaters are at first made slowly and later on with a rush to advance into the *kheddah*. As soon as the last animal has entered a man screened from observation cuts the rope by which the door of the trap is held and this closing by its own weight the herd is captured. The beaters then surround the *kheddah* and by drums guns and torches frighten any brave animal who may threaten an attack upon the enclosure. After vainly struggling for a time the frightened monsters of the forest crowd together in the centre and offer very little further attempts upon the stockaded trap. Food and water are supplied to them and after all arrangements have been completed and the animals have become in a measure accustomed to their captive state tame female elephants, with one or two attendants enter the *kheddah*. These singling out the largest victims separate them from the herd two females getting one on each side hustle their prisoner towards a tree. The attendants slip off the tame elephants and secure its hind legs with strong ropes or chains with which they also attach it to the tree. Alarmed at this procedure when efforts at freedom are now unavailing it struggles violently but in time submits. According to **Mr Sanderson** the strongest and bravest animals become the most docile when thus convinced that they

The Indian Elephant. (G Watt)	ELEPHAS indicus.
<p>have been conquered As soon as all have been secured they are each in turn led out of the <i>kheddah</i> between tame elephants and picketed in a place previously arranged Food and water are pressed up to them and through great kindness in giving them luxuries such as sugar cane they get accustomed to their attendants In a very few days owing to the attendants speaking and singing to them and cooking their food hard by they become so familiar with the presence of human beings that they allow themselves to be approached and fondled In many cases so successful is this treatment that the attendants alter a few days are enabled to ride them and commence the process of training to a code of signals gestures and words They are then marched off to the Government stables or are sold locally to traders</p>	METHODS OF CAPTURE
<p>SEASON OF ELEPHANT CAPTURE —Sanderson gives the season of capture as from the beginning of December the party being equipped for two or three months The hunters having previously marked down a good herd the beaters a mile or so distant file off to right and left two men stopping every 50 yards or so until they meet behind having thus enclosed the herd within a space of 6 or 8 miles in circumference Once thus surrounded the elephants can only escape through great carelessness Within a couple of hours a simple enclosure is constructed along the line taken up by the men and the elephants finding plenty food make little effort to escape during the day and at night they are made to retire into the interior of the enclosure by fires drums and guns &c discharged at them along the line of capture</p>	SEASON OF 95
<p>It may suffice in completing this brief review of the capture of herds of elephants to quote here one or two passages from early writers in order to show how closely the present practice follows that pursued two or three hundred years ago In the <i>Ain i Akbari</i> (Blochmann's Transl 284) it is said of Elephant hunts —</p>	
<p>There are several modes of hunting elephants</p>	
<p>1 <i>Kheddah</i> —The hunters are both on horse back and on foot They go during summer to the grazing places of this wonderful animal and commence to beat drums and blow the pipes the noise of which makes the elephants quite frightened They commence to rush about till from their heaviness and exertions no strength is left in them They are then sure to run under a tree for shade when some experienced hunters throw a rope made of hemp or bark round their feet or neck and thus tie them to the trees They are afterwards led off in company with some trained elephants and gradually get tame One fourth of the value of an elephant thus caught is given to the hunters as wages</p>	EARLY MODES OF HUNTING <i>Kheddah</i> 96
<p>2 <i>Char kheddah</i> —They take a tame female elephant to the grazing place of wild elephants the driver stretching himself on the back of the elephant without moving or giving any other sign of his presence The elephants then commence to fight when the driver manages to secure one by throwing a rope round the foot</p>	<i>Char kheddah</i> 97
<p>3 <i>Gad</i> —A deep pit is constructed in a place frequented by elephants which is covered up with grass As soon as the elephants come near it the hunters from their ambush commence to make a great noise The elephants get confused and losing their habitual cautiousness they fall rapidly and noisily into the hole They are then starved and kept without water when they soon get tame</p>	<i>Gad</i> 98
<p>4 <i>Bar</i> —They dig a ditch round the resting place of elephants leaving only one road open before which they put up a door which is fastened with ropes The door is left open but closes when the rope is cut The hunters then put both inside and outside the door such food as elephants like The elephants eat it up greedily their voraciousness makes them</p>	<i>Bar</i> 99

**ELEPHAS
indicus****MODE OF
HUNTING****The Indian Elephant**

forget all cautiousness and without fear they enter at the door. A fearless hunter who has been lying concealed then cuts the rope and the door closes. The elephants start up and in their fury try to break the door. They are all in commotion. The hunters then kindle fires and make much noise. The elephants run about till they get tired and no strength is left in them. Tame females are then brought to the place by whose means the wild elephants are caught. They soon get tame.

From times of old people have enjoyed elephant hunts by any of the above modes. His Majesty has invented a new manner which admits of remarkable *finesse*. In fact all excellent modes of hunting are inventions of His Majesty. A wild herd of elephants is surrounded on three sides by drivers, one side alone being left open. At it several female elephants are stationed. From all sides male elephants will come to cover the females. The latter then go gradually into an enclosure whither the males follow. They are now caught as shewn above.

Abul Fazl's description of the construction of an enclosure the door of which is secured by the cutting of a rope is practically that pursued by Sanderson. The fact that after being frightened for a time by the noises and fires of the men outside the enclosure the animals as if in despair commence to eat the food provided for them just as described also by Sanderson shows how accurately the author of the *Ain-i-Akbari* had observed the Elephant capturing operations pursued in Akbar's time.

Mr Blochmann gives as a footnote to the above an account of a capture of elephants made in the presence of the Emperor Jahāngir which might be almost read as a scene from Mr Sanderson's most detailed descriptions of his Kheddah operations. The passage is as follows — A large number of people had surrounded the whole jungle outside of which on a small empty space a throne made of wood had been put on a tree as a seat for the Emperor (Jahāngir) and on the neighbouring trees beams had been put upon which the courtiers were to sit and enjoy the sight. About two hundred male elephants with strong nooses and many females were in readiness. Upon each elephant there sat two men of the Jhairyah caste who chiefly occupy themselves in this part of India (Gujrat) with elephant hunting. The plan was to drive the wild elephants from all parts of the jungle near the place where the Emperor sat so that he might enjoy the sight of this exciting scene. When the drivers closed up from all sides of the jungle their ring unfortunately broke on account of the density and impenetrability of the wood and the arrangements of the drivers partially failed. The wild elephants ran about as if mad but twelve male and female elephants were caught before the eyes of the Emperor (*Iqbalnamah* p 113). An earlier writer Linschoten (frequently placed under quotation in this work) speaks of herds of a thousand elephants being surrounded and a selection of a hundred or more made. Linschoten's account is historically of interest since it shows that the Kheddah system was followed in Burma 300 years ago — They are found also he says in India and in Bengala and in Pegu great numbers where they (use to) hunt them with great troupes of men and tame elephants and so compass and get into a heape a thousand or two (at the least, whereof they choose out a hundreth or more as they néede, and let the other go that the Countrey may alwaies have great store. Those they (doe) in time (bring up and) learne (them to travel) with (them and to indure) hunger and thirst (with) other inventions so long that they beginne to understand men when they speake. Then they annoint them with Oyle and wash them and so do them great good whereby they become as tame and gentle as men so that they want nothing but speech' (*Linschoten Vol II, p 1*). This remarkable

Capture in
Jahangir's
presence

Capture in
Burma.

The Indian Elephant	(G Watt)	ELEPHAS indicus.
<p>observer in another passage alludes to the process of training to the habit of the rider sitting on the neck with his feet under the ears and to his using an iron hook to direct the action of the animal His observation as to the elephant giving a rope one turn round his tusk and grasping the end between his teeth is almost in the very words used by Sanderson so that this clever trick is no modern acquisition —“ Then the keeper getteth upon the necke (of the elephant) and thrusteth his feet under his eares having a hooke in his hand which he sticketh on his head where his stones lye that is to say above betweene both his eares which is the cause that they are so well able to rule them and comming to the thing which they are to draw they binde the fat or packe fast with a rope that he may feele the waight thereof and then the keeper speaketh unto him whereupon hee taketh the corde with his snout and windeth it about his teeth and thrusteth the end into his mouth and so draweth it hanging (after him) where they desire to have it If it be to be put into a boate then they bring the boate close to the shore of the Key and the Elephant putteth it into the boate himsele and with his snout gathereth stones together which he laeth under the fat (pipe or packe) and with his teeth striketh (and thrusteth the packe or vessel) to see if it lie fast or not (<i>Linschoten Vol II p 2</i>) To any person who has seen the elephant piling great logs of timber at Moulmein this feat of placing stones underneath the pipes of oil &c will not appear an overdrawn picture The Moulmein elephants may be witnessed while at work to carefully examine if the logs lie straight and to tilt them this way or that way until parallel In both cases the intelligence may have proceeded however from the rider who by almost imperceptible hints with his heels knees hands or words commands the trained actions of the elephant But the illustration shows the high state of elephant training that existed in India during Linschoten's time (1596)</p>		<p>MODE OF HUNTING</p>
<p>TRADE OR SUPPLY AND DEMAND IN ELEPHANTS</p> <p>Sanderson while admitting that both the Ceylon and the African elephant may be viewed as threatened with extermination is fully convinced that the Indian stock is in no way endangered by the present or even a greatly increased demand The animal's captured purely for the purpose of being utilized as a beast of burden and is not as in Africa ruthlessly destroyed on account of the ivory Reckless persecution is prohibited and a vast reform effected by the substitution of the Kheddah system of capturing in place of the cruel method of securing them in pits</p> <p>EXTERMINATION —By the pit process the animal was subjected to the greatest cruelty being even allowed to starve to death from the apathy of the owners of the pits By far the largest proportion of the animals so procured also died before or soon after they left the pits Many were at the same time rendered useless through their limbs being broken by the fall into the pits In some localities elephants are so numerous that they effect heavy damage on the neighbouring crops and on this account rewards were at one time (in Madras for example) offered for their destruction The greatest enemy to the elephant is human enterprise in reclaiming jungle tracts of country Sanderson says The number annually caught by the Government establishments is comparatively very small and there is no doubt that all the forest ground that can be legitimately allowed to the wild elephant is as fully occupied at present as is desirable I have examined the elephant-catching records of the past forty five years in Bengal and the present rate of capture attests the fact that there is no diminution in the numbers now obtainable whilst in Southern India, elephants have become so numerous of late years that the rifle will have</p>		<p>TRADE 100</p> <p>Extermination 101</p> <p>No diminution observable in India. 102</p>
<p>E 102</p>		

**ELEPHAS
indicus.****The Indian Elephant****PRICES
103**

to be again called into requisition to protect the ryots from their depredations unless more systematic measures for their capture and utilization than are at present in vogue be maintained

PRICES—According to Sanderson Kabul merchants are the chief traders in elephants and the principal countries which meet the Indian demands are Ceylon Burma Siam and a few of the forests of continental India He adds— from several causes the number brought into the market is now smaller than formerly and prices are rising accordingly He then gives a table of statistics of imports from Ceylon from 1863 the highest number in any one year having been 270 but in the year 1870 the imports shrank to 30 and in 1876 had still further declined to only 3 The chief Indian mart where elephants are sold to the public is Sonepoor on the Ganges opposite Patna a *mela* being there held some time in October or November The Government of Bengal obtains its supplies from the Kheddah Establishment at Dacca in Eastern Bengal The average annual capture in connection with that establishment is reported to be about 60 and Sanderson adds that an elephant which cost the Government £40 to capture would be sold in the market for at least £150 In addition to the captures made direct by Government licenses are also issued for private traders to capture Government reserving the right to purchase a certain class of animals over and above those stipulated for in payment of license The Madras Government is entirely dependent on Burma for its supplies since there is no catching establishment in that Presidency Elephants are however frequently captured by the Mysore Government Only recently Mr Sanderson secured on behalf of that State a herd of some 80 elephants According to the published returns Government possesses on an average about 1 600 elephants and by present regulations only females are retained for the public service This is owing to the risk attending males becoming *must* It may in conclusion be stated that Mr Sanderson has demonstrated that capturing elephants is actually remunerative to Government in addition to the fact that continuity of supply at a moderate charge is secured It may be said that in the open market a good serviceable elephant costs at present £2 000 but year by year with the extension of railway communication and the opening up of roads the necessity for elephants is becoming less and less They are of greatest use in regions where road and rail communication is defective and chiefly in carrying large articles such as tents and other heavy baggage that cannot conveniently be broken into smaller portions suitable for cattle and mules

**Capturing
Stations.
104****Number
captured
105****DOMESTICA
TION
106****DOMESTICATION**

In modern times the Indian Elephant has not been bred in captivity but this Mr Sanderson explains is a matter of economy and convenience not of necessity It is both easier and cheaper to capture full grown animals than to be deprived of the usefulness of a female during a certain period of her pregnancy and during also the subsequent three or four months especially when considered in the light of the expense of rearing and training the young for a considerable number of years before they attain the age of maturity During the Mogul Empire however elephants were regularly reared in captivity and apparently some care was bestowed on the selection of breeds In Burma especially among the Karens the female elephants are shackled and left at large in the jungles (during the non working months) in order to ensure the attentions of wild males and the young obtained by this semi domesticated system are regularly reared But as Sanderson adds "in Burma fodder is plentiful and the young stock cost nothing till taken up for sale" In India generally fodder is so expensive and the animals are at the same time so

**ELEPHAS
indicus****The Indian Elephant****CHARACTER AND PHYSICAL PECULIARITIES OF
ELEPHANTS****PECULIARI-
TIES
107**

Much has been written regarding the intelligence and sagacity of the elephant. Sanderson contends that in its wild state the elephant in allowing itself to be captured by so many transparent stratagems which it might easily frustrate manifests far less intelligence than most other animals. Nature appears to have gifted it with a certain conscious security proceeding more from its magnitude and strength than from its intelligence and sagacity. When once captured its timidity appears to make it more docile than almost any other animal. There is in fact no other known animal where wild adults can be captured and domesticated with so much ease. By various tricks and contrivances it is readily educated and to such perfect on that the slightest hint from the *mahout* (or conductor) makes it obey his utmost wish. It is the expertness of the *mahout* apparently that has given rise to the numerous tale regarding the intelligence of his pupil. Sanderson ridicules the well known tale of the elephant who revenged itself on the tailor by throwing dirty water over him. The elephant is fond of water and cannot he contends be supposed to reason out that this is not likely to be the case with man also. If fable it be there would seem to be some ground for the belief that a similar power of remembrance of injury done is fully possessed however, by the elephant. Linschoten says on this point— but he that hurteth them hee must take heede for they never forget when any man doth them injurie untill they be revenged. Sanderson while extolling the obedience gentleness and patience of the elephant says he is decidedly stupid and devoid of originality. This to a large extent seems true but the majority of animal could not be educated even after centuries of domestication to perform the useful obediences to man's commands which the adult elephant learns in a month after capture.

**GESTATION
108**

GESTATION—The reason of the elephant not being bred in domestication has already been fully stated and one or two passages have been quoted in which the period of gestation has been dealt with. It may not be out of place here to revert however to this subject. The statement that the male calf is carried longer than the female receives confirmation by modern observers. Sanderson writes. The period of gestation in the elephant is said by experienced natives to vary as the calf is male or female being 22 months in the case of the former and 18 in the latter. I cannot of my own observation afford conclusive proof that such is the case though I believe there is some truth in the statement. I have known elephants to calve 20 months after capture the young always being males when 18 months were exceeded. According to Coorse the duration of pregnancy is 20 months and 18 days and in the *Asian* (June 5th 1883) instances of elephants breeding in domestication are given and the duration of pregnancy stated to have been 583 to 690 days.

**WEIGHT
109**

WEIGHT MEASUREMENTS—The elephant breeds but once in two and a half years and only very exceptionally produces twins though two calves usually suck at the same time. The calf sucks with its mouth not its trunk as has been incorrectly recorded. The calf usually stands three feet high at the shoulder when born and the trunk is then only two inches long. The average weight at birth is generally 200lb a large full grown elephant weighs 6 000 to 7 000lb (3—3½ tons).

**AGE
110**

AGE—The medium height of a full grown elephant is 7½ to 8 feet but 9 feet 10 inches as the height of the shoulders is often attained. Sanderson points out that the height of an elephant may be obtained by casting a tape twice round the forefoot. Maturity and full growth is attained at from the 20th to the 25th year but the first calf is generally born when the

The Indian Elephant	(G Watt)	ELEPHAS indicus
<p>cow is 13 to 16 years of age and this very frequently takes place in September to November. It is believed the full age of an elephant is 120 years. At about 35 years a male obtains the strength to give him command of a herd. Male elephants of mature age are subject to periodical paroxysms supposed to be of a sexual nature. The animal is then termed <i>must</i> or mad. The fits of <i>must</i> Sanderson affirms differ in duration in different animals in some they last for a few weeks in others for even four or five months. Elephants are not always violent or untractable under their influence being frequently only drowsy and lethargic. The approach of the period of <i>must</i> is indicated by the commencement of a flow of oily matter from the small hole in the temple on each side of the head which orifice is found in all elephants male and female. The temples also swell. The elephant frequently acts somewhat strangely and is dull and not so obedient as usual. In the advanced stages the oily exudation trickles freely down from the temples which are thus much swollen.</p> <p>On the first indications the elephant is strongly secured. If he becomes dangerous his food is thrown to him and water supplied in a trough pushed within his reach. Sanderson continues. The flow of <i>must</i> occasionally but very seldom occurs in female elephants. I have seen it twice in newly caught females in the prime of life and in very full condition. It never occurs I believe in tame female elephants.</p> <p>In the wild state although the discharge takes place it does not appear to be often associated with madness. This seems to depend as Steel expresses it to some extent on the condition of the domesticated animal <i>highly fed and lightly worked</i>. It has been supposed that male elephants as well as females come into heat and although they seem always prepared to pay attentions to females there are certainly seasons when the sexual instinct in them runs higher than at others and which may correctly be called rutting times. The male approaches the female in the attitude common to most quadrupeds and not in the crouch ing position assumed by the camel.</p> <p>PACE — The only pace of the elephant is the walk capable of being increased to a fast shuffle of about fifteen miles an hour for a very short distance. It can neither trot canter nor gallop. It does not move with the legs on the same side together but nearly so. A very good runner might keep out of the elephant's way on a smooth piece of turf but on the ground in which they are generally met with any attempt to escape by flight unless supplemented by concealment would be unavailing. An elephant can not jump can never have all four feet off the ground together. As Sanderson points out a trench seven feet wide is impassable to them though the step of a full grown animal may be put down at 6½ feet. In a further passage Sanderson says that four miles an hour is a good pace for an elephant but long legged ones will swing along at five or upwards for a moderate distance say ten miles. I have known he adds thirty nine miles done at a stretch at a moderate pace. Single wild elephants that have been wounded or much frightened will often travel as far as this in a few hours without a halt. The elephant is remarkably sure footed being known to charge down hill with as much ease as up. He swims remarkably well the body being down in the water with the trunk carried erect for breathing. In fording shallow streams he moves cautiously and may be trained to tramp down materials given him to ensure a better footing. Should the ground sink underneath him he rolls over on his side to liberate his feet. It is thus recommended to send one elephant over a ford without his load in order to ascertain the nature of the shallow river bed before taking others with loads across.</p> <p>LOADING — The elephant equipment should be so constructed that the</p>		PECULIARITIES
		MUST III
		PACE II2
		Cannot Jump II3
		LOADING II4
		E II4

**ELEPHAS
indicus****The Indian Elephant****PECULIAR
TIES****Load half a
ton
II5****Not suitable
for draught
purposes
II6****SLEEPING
II7****DETECTION
OF AGE
II8****Dead
Elephants
II9**

weight of the load rests on the upper part of the ribs not on the spine. Half a ton is considered a good load for an elephant intended for continuous marching. **Sanderson** says I have known a large female carry a pile of thirty bags of rice weighing 82lb each or 1 ton and 2 cwt. from one store room to another three hundred yards distant several times in a morning. By the Bengal Commissariat Code elephants are expected to carry 1640lb exclusive of attendants and chains for which 300lb extra may be added but this is too great a weight for continued marching. **Captain Hood** gives the following estimate for loads —elephants 7 feet 6 inches high not to exceed 6 maunds 8 feet 7 maunds 9 feet 8 maunds and 10 feet 9 maunds. This is for hilly country and for the plains he allows to each of the above animals 2 maunds extra. An excessive load tires the animal too soon makes the feet sore and causes it to stumble. An average load is therefore equal to that which would be carried by three camels or by seven and a half mules. On the march metalled roads are to be avoided as these soon injure the feet and render the elephant useless. On this point **Steel** writes No part of the body is more liable to disorder and complete temporary incapacity results from injury to or disease of these important organs. Although very sure footed an elephant picking his way through rocky dry beds of streams a trench or precipitous nullah is almost impassable to him owing to his inability to jump. On ascending steep banks of streams with a load he is liable to fall on the back and in such cases is almost invariably killed. He is not suited for draught purposes but has often proved most useful in extricating guns from awkward positions in such cases however he more frequently shoves than draws the load. It has already been remarked that the small Nepál elephant is more suited for hill work than the Assam or South India animal.

SLEEPING —The elephant requires very little sleep but if disturbed in the few hours that are necessary he soon gets out of working form. There should be strict silence in the elephant camp after 9-30 P M and the sleeping ground as **Ouchterlony** recommends should if possible be on the incline the animals being placed with the hind up hill. Unless this precaution be observed should the animal lie down he will most probably be unable to rise again without the aid of other two elephants. To raise him it has been recommended to give simulants then push him on one side and leave him to rest for a time thereafter push him on to his legs. In rising the elephant elevates the forehead first and in lying he flexes the fore limb at the elbow and the hind limb at the stifles. The fore foot is bent inwards with the sole turned towards the root of the trunk which organ lies curled upon the ground. (*Steel*)

DETECTION OF AGE —In detecting the age of elephants no difficulty is experienced with very old or very young animals with intermediate ages however it is very difficult to say within a few years. Up to six or seven years the top of the ear is not turned over (as in man) but with advancing years it laps over —in old elephants very much so and with age also the margin of the ear gets torn. It is a common saying that no one has seen in the jungles the remains of a dead elephant from which circumstance the natives believe he never dies. **Sanderson** and most sportsmen attach little importance to this circumstance and affirm that it is no more to be wondered at than the rarity of finding the skeletons of other wild animals. The abundance of animals that greedily devour carcasses when taken into consideration with the powerfully decomposing influences of the climate are supposed to be sufficient causes for the fact of the rarity with which the bodies of wild animals are found in the forest.

STATELY BEARING —The elephant is peculiarly suited for the stately

The Indian Elephant.	ELEPHAS indicus.
<p>processions, so much beloved by Native Princes His graceful motion and great size give him a charm which no other animal possesses To the sportsman he is of exceptional value since his obedience and courage render it comparatively speaking safe to closely pursue the tiger and other large game until so hard pressed that exposure to the rifle becomes a necessity The merit of the elephant as a baggage animal in regions with defective communication has already been dealt with and there thus remains only the question of his utility or otherwise in warfare In the <i>Ain i Akbari</i> will be found a description of the manner in which very courageous elephants were employed by Akbar on the actual battle field Large <i>howdahs</i> were constructed to carry a number of soldiers who discharged their guns spears &c on the elephant charging the enemy We read also that the African elephant was once upon a time domesticated and that the Carthaginians employed them as fighting animals in their wars against Rome On the conquest of Carthage the Romans for some time after also employed elephants but more especially in the amphitheatre and in military pageants Thus during the ascendancy of the Roman Empire elephants were quite common in Europe but they ultimately disappeared and for centuries were altogether unknown and what is more remarkable the African elephant since the fall of Carthage has not been again domesticated We read of the Indian elephants on the battle field from the date of the wars against Alexander the Great down to modern times but with the English army in India he is practically purely a baggage animal In concluding an instructive chapter on the adaptability of the elephant for certain work in modern warfare Steel summarises his arguments as follows —</p> <p>I —The elephant as an actual weight bearer is most valuable</p> <p>II —He is very difficult to feed therefore but few can be allowed to the front on service</p> <p>III —But a few are very useful there to assist guns and other heavy draught over awkward places—whether sandy muddy or narrow</p> <p>IV —In siege trains for slow draught movement of heavy guns for carriage of scaling ladders &c &c elephant legitimately finds a place</p> <p>V —At the base and along the line of communications where they can easily feed and are not exposed to attack or capture elephants are a most useful means for the transport of heavy baggage stores and munitions of war In this respect they are an excellent substitute for wheeled transport if roads be impracticable for the latter But they cannot advantageously replace carts and waggons or traction engines when the roads are fit for draught</p> <p>VI —The spread of railways and metalled roads lessens the need for elephant transport but in unopened jungly country the elephant is invaluable for Commissariat purposes Thus <i>wherever there is a want of good roads from the base the elephant finds his proper place as an animal of transport</i> he is there more useful than any other animal and will to an important extent compensate for the impracticability of wheeled transport</p> <p>VII —To engineers the elephant proves most useful for shifting heavy guns for moving heavy beams and other weighty articles in throwing down walls and in various other ways</p> <p>VIII —Once the elephant acted the part of artillery in war—breaking up compact masses of Infantry at once by the weight of its charge and by the dread its appearance gave rise to It is now used at the front for artillery purposes only in carrying small guns or in drawing those of Heavy Field Batteries</p>	<p>PECULIARITIES.</p> <p>Baggage Animal. 120</p> <p>Utility in ancient warfare. 121</p> <p>Adaptability to modern warfare</p>

**ELEPHAS
indicus.****The Indian Elephant****DISEASES TO WHICH ELEPHANTS ARE SUBJECT, AND
REMEDIAL AGENTS****DISEASES
122**

WILD AND CAPTIVE ELEPHANTS—Few travellers appear to have observed the wild elephant suffering from more than the natural infirmity of age. The young are always in good health. In captivity the diseases to which the animal is liable are probably all due to the sudden and complete change of life forced on him. It is often difficult to procure so large a quantity of grass as he requires and the habit has thus to be learned of feeding on leaves of trees which in the wild state the animal rarely eats. In fact with the exception of a few trees the leaves and boughs of which are partaken of more as a relish than a regular article of diet the elephant confines himself to eating grass. His habits are also methodical and he rarely exposes himself to the scorching influence of the sun. At fixed intervals he drinks and bathes at others feeds or reclines under deep and grateful shade while his hours of sleep are equally a matter of rigid habit. All this is to a large extent disturbed by domestication. The mahout finds it easier to procure for his charge a meal of boughs of trees than of grass and loving himself the midday heat unless carefully watched he will invariably start foraging late in the morning most probably at the very hour he should be returning home with the day's supply. Sanderson says that there are two diseases to which the recently captured elephant is liable. These are the dropsical *yaarba hd*—accumulations of water under the skin—and the wasting *yaarba hd* in which the animals fall gradually away to mere skin and bone. Freedom he adds from restraint and liberty to graze as the animal likes is the only cure for both these diseases. Medicine is of little or no avail.

**Yaarba hd
123****Colds
124**

The elephant is extremely liable to cold and extremes of climate or too rapid changes should be avoided. Thus for example when on the march the elephant should be allowed half an hour's rest to cool down before he is made to swim a river if the water be cold. If this precaution be not observed the animal is very apt to acquire the troublesome disease known as *chowrung*.

**Chowrung
125****BLOOD
126**

CLASSIFICATION OF DISEASES—Steel classifies the diseases to which the elephant is subject into—**NON SPECIFIC DISORDERS OF THE BLOOD** such as Debility *eg yaarba hd (saarbad)* fever rheumatism &c **SPECIFIC DISORDERS OF THE BLOOD** *eg* Pleuropneumonia doubtfully obtained from the epidemic outbreaks among cattle. Dysentery or Murrain. Anthrax. Rabies from dog bites. Foot and Mouth disease (*kulta*). Variola. Elephantia or Elephant Small pox.

**DIGESTIVE
127**

But the elephant is also subject to many of the ordinary maladies which affect the **DIGESTIVE SYSTEM** such as Simple Colic. Flatulent Colic. Enteritis. Diarrhoea. Dysentery. Parasites in the Alimentary Canal. Fascioliasis and Hepatitis. Similarly the **RESPIRATORY ORGANS** are frequently affected by the usual diseases to which man and animals are alike liable such as Catarrh. Sore throat. Inflammation of the lungs and Bronchitis. Inflammation of the Kidneys as Gilchrist pointed out is also of fairly frequent occurrence and amongst **NERVOUS COMPLAINTS** may be mentioned simple Phrensy after Anthrax while Encephalitis or inflammation of the brain and its membrane often occurs the animal becoming dangerous. Apoplexy. Tetanus and Paralysis have been observed in certain cases.

**RESPIRA
TORY
128****URINARY
129****NERVOUS
130****SKIN
Ulcerations
131****Sore-backs
132**

THE SKIN though remarkably thick is very sensitive. Insects often annoy the animal very much while **SKIN DISEASES** Ulcerations. Boils &c are frequent and dangerous the more so since a surface cure is only too frequently effected with serious later consequences. Sanderson remarks that **SORE BACKS** from chafing of gear are exceedingly tedious.

The Indian Elephant.	(G Watt)	ELEPHAS indicus.
<p>to cure ' A free use of the knife great care in cleansing the wound and the application of plenty of turpentine strongly impregnated with camphor are he affirms the best methods for insuring a speedy cure The deep burrowing holes usually present in sore-backs should be well packed with tow steeped in the camphorated turpentine This stuffing prevents the wounds closing up too quickly the growth of new flesh should be encouraged from the bottom not at the surface of the sore A cloth steeped in <i>margosa</i> (<i>neem</i> <i>Melia Azadiracta</i>) oil should be tied over the wound to prevent flies approaching it and irritating the elephant Oliver recommends that the wound should be freely washed using a Read's enema syringe to pump the water into the wound Thereafter a dressing with turpentine will he affirms speedily produce healthy granulation On the march SORE FEET is one of the most serious disorders perhaps the most serious after the risk of injury to the back from imperfectly fitting gear A slipper to fit over the foot is by most authors recommended to be carried in case of need and a preparation known as <i>chôb</i> is regarded as most useful in overwearing of the feet This consists among other ingredients of Catechu 3lb marking nut powder (<i>Anacardium</i>) 6lb Gum of <i>Sal</i> (<i>Shorea robusta</i>) 1½lb Wax 2lb Jaggery 6lb Gingili oil (<i>Sesamum</i>) 6lb &c made into a paste and applied over the surface of the foot Steel in concluding his admirable account of the diseases to which the elephant is subject gives a list of the remedies in most general use He remarks that the doses may be said to be twice those given to the ox for corresponding maladies The mahouts rarely prescribe purgatives but according to Sanderson the elephant eats earth for that purpose Emetics as with the horse have no action on the elephant In addition to the ordinary drugs in use for other animals such as alum chalk sulphate of copper camphor &c &c Steel mentions the following Indian drugs —the seeds of <i>Butea frondosa</i> as a vermifuge <i>Calotropis gigantea</i> (madar root and flower) as a narcotic marking nut (<i>Anacardium occidentale</i>) as a stimulant sweet flag (<i>Acorus Calamus</i>) as a tonic and stimulant thorn apple (<i>Datura fastuosa</i>) as a narcotic Bonduc nut (<i>Cassia Bonducella</i>) as a stimulating tonic &c &c</p>		<p>DISEASES. CURES. 133</p> <p>Camphorated turpentine. 134</p> <p>Sore-feet. 135</p> <p>Chob. 136</p> <p>Doses of Medicines. 137</p>
<p>FOOD AND FODDER OF ELEPHANTS</p>		<p>FOOD AND FODDER</p> <p>Chief Causes of Disease 138</p> <p>Rate of Mortality 139</p>
<p>Sanderson urges that if the elephant obtains a sufficient amount of grass no animal is easier kept in a good state of health He writes It is common to see elephants in poor condition suffering from nothing but partial starvation being treated with medicines and nostrums for debility whilst their appetites are good and only require a sufficiency of fodder to effect a cure It may truly be said that all ailments to which elephants are subject are directly or indirectly caused by insufficient feeding Underfed elephants become weak and unable to stand exposure they cannot perform their work and are laid open to attack by even such remote maladies as sunstroke and sore back through poor condition The elephant in common with all wild animals goes to no excess in any of its habits and there is no reason except bad feeding why the rate of mortality should be so high as it unhappily is amongst Government elephants in India The actual work they have to perform is seldom arduous enough to affect elephants in health</p> <p>According to Sanderson the elephant should be fed chiefly on grasses at least where that is procurable They become accustomed to tree fodder but in his opinion this is unnatural and has a good deal to say to the liability of the domesticated animal to various diseases The amount of fodder Sanderson says that should be given to an elephant 'is much</p>		<p>Tree Fodder; Acquired Habit. 140</p>

**ELEPHAS
indicus****The Indian Elephant****FOOD AND
FODDER**

Weight of
Fodder
necessary
I41

greater than is usually supposed The Government allowance in Bengal and Madras for an elephant of full size is as follows —

BENGAL		lb
Green fodder— <i>vis</i>	grasses branches of trees sugar-cane &c	450
Or in lieu of the above	dry fodder <i>vis</i> stalks of cut grain	205
MADRAS		
Green fodder		250
Or dry fodder		125

Grass should
be chief
Fodder
I42

But the amount of suitable green fodder which a full grown elephant will consume in eighteen hours I have found by numerous experiments to be much greater than this—*vis* between 600 and 700lb. This is what a beast of average appetite will actually eat excluding what it throws aside and I have seen a large tusker eat 800lb or 57 stone in eighteen hours. In another passage Sanderson adds since representing the inadequacy of the above allowances to Government in official correspondence on the subject I have been informed that experiments have been made in the Bengal Commissariat Department in continuation of my own which have proved that an elephant will eat 750lb of dry sugar cane which is more feeding fodder than grass per diem and that steps are being taken to remodel the fodder scale. Steel writes No doubt grazing when possible is the best method of feeding but sufficient range is not always procurable and in the hot season grass runs short even then however the branches of trees can be obtained and the leaves which constitute their hot weather foliage. Slymm wrote my opinion is that grass should form the principal kind of green fodder all the year round and that either on the march or when the good kinds are not obtainable or as a kind of variation its use may be substituted either by banian jack tree peepul bamboo plantain leaves fresh paddy straw or sugar cane. The plantain leaves I would not recommend during cold or chilly weather. Forsyth says the elephant will not of choice feed on bamboo though the young shoots are very acceptable and nutritious. When plenty good grass can be obtained as at the beginning of the rains the *ratib* (or rations of food) may be reduced and increased when the fodder (*cherrai*) is scanty or of poor quality. The *ratib* consists (as prescribed in the Commissariat Code) of *atta* (coarse flour) or rice of the third quality or of *dhán* (unhusked rice) in twice the amount of either *atta* or husked rice. This grain is to be cooked by baking on an iron plate and made into cakes or *chapatis* weighing about 2lb each. Grain is also often made up with straw or leaves into small packages and placed in the elephant's mouth. He is fond of being thus fed and is a slow eater of grain otherwise as he can only pick it up in small quantities. Much difference of opinion prevails as to whether the grain should be given cooked or uncooked. Salt and oil are also allowed to the elephant attendants but the latter for external application only. According to the scale of rations 15lb of grain a day is allowed to each elephant 2 ounces of salt and 1 ounce of oil.

GRAIN
I43

Amount of
per day
I44

Sanderson is opposed to giving elephants large allowances of grain and would prefer a better quality and large quantity of fodder. He contends that the grain diet is unnatural. The wild elephant however regularly makes depredations on the fields and moreover digs up roots and other farinaceous additions to his fodder diet. Tennent mentions for example the destruction of Sago palms (*Caryota urens*) effected in Ceylon by the elephant. These palms are split open and their farinaceous pith greedily eaten. The chief difficulty appears to be in securing that the ration of grain is actually given to the elephant since its allowance of fodder is lessened in consideration of its expensive diet of grain.

E I44

The Indian Elephant.

(G Watt)

**ELEPHAS
indicus**

The following enumeration of the fodder plants specially mentioned by authors as given to the elephant has been obligingly furnished by Mr J F Duthie —

ELEPHANT FODDER

**FODDER
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TREES AND SHRUBS

Acacia Catechu, Willd Vol I, p 27*A ferruginea* DC Vol I p 59.*A lenticularis* Ham Vol I, p 52.*A Suma Kuru* Vol I, p 60

The above *Acacias* are used as Elephant fodders in the Central Pro-
[vinces

Ægle Marmelos Corr Vol I p 117*Artocarpus integrifolia* Linn The Jack fruit Tree Vol I, p 330*Balanites Roxburghii* Planch Vol I, p 363.*Boswellia serrata* Roxb Vol I, p 515*Butea frondosa* Roxb This seems doubtful (See Vol I, p 555)*Capparis horrida* Linn f (See Vol II, p 133)*Ficus bengalensis* Linn (Brandis 412)*F glomerata* Roxb (Brandis 422 Gas Poona 53)*F infectoria* Roxb (Brandis 414 Stewart Pb Pl 214)*F nitida* Thunb eaten in C P*F religiosa* Linn (Brandis 415 Gas Poona 51)*F Roxburghii*, Wall (Brandis 422)*F tomentosa* Willd eaten in C P*F Tsiela* Roxb eaten in C P*Garuga pinnata*, Roxb*Musa paradisiaca* Linn*Odina Wodier* Roxb (Brandis 123)*Ougeima dalbergioides*, Benth (according to Mr A. Smythies

Forest Department Dehra)

Phoenix acaulis Roxb eaten in C P*Ricinus communis*, Linn*Shorea robusta* Gaertn eaten by wild elephants in dry seasons in C P*Tamarindus indica*, Linn (in the Baroda State)

Typha elephantina, Roxb (Elephant grass one of the most extensively
used marshy plants)

GRASSES

Bambusa arundinacea, Retz (See Vol I, 391)*Dendrocalamus strictus* Nees (See Vol III 77)*Elionurus hirsutus*, Munro (Fodder Grasses of N India p 28)*Saccharum spontaneum*, Linn (Fodder Grasses of N India p 25)

It may in conclusion be remarked that the above grasses are only those that are specially mentioned by authors or which occur in such abundance, as to make them of special merit as Elephant fodders. Any grass eaten by cattle (except perhaps the Lemon grass) may be given to elephants and the leaves from a few more trees than the above are occasionally collected. In Ceylon for example the elephant often destroys the young cocoa-nut palms by eating the central bud or cabbage. Sir E Tennent mentions the thick dark leaves of *Messua ferrea* the leaves of the wood apple *Feronia elephantum*, and those of *Mimusops indica*, and many others, as all eaten. Tennent adds that the stems of the plantains the stalks of the sugar-cane and the feathery tops of the bamboos are irresistible luxuries. Pine-apples, water melons and fruits of every description are voraciously

**ELEPHAS
indicus.****The Indian Elephant****FODDER.**

devoured and a cocoa nut when found is first rolled under foot to detach it from the husk and fibre and then raised in the trunk and crushed almost without an effort by its ponderous jaws **Steel** writes Practically most green stuffs grasses and leafy branches are acceptable to the elephant and can be utilized by him as food—much must be left to his judgment in selection on the emergencies of the march and when the Commissariat stores run short on a campaign

(For further information see the article **FODDER**)

**FOOD
I46****ELEPHANT FLESH**

Elephant flesh is much relished by certain hill tribes as an article of diet so that in addition to its utility as a baggage animal the elephant may be said to be of value as an article of human food **Sanderson** narrates a remarkable accident where two tame elephants tied to a recently captured one were all three mysteriously drowned while swimming the Kurnafoolie river of Chittagong hill tracts Next day the Joomas swarmed in their boats over the place where the animals sank The carcasses soon floated on the surface and were cut to pieces and every particle of their flesh removed Amongst the Hindus generally a singular belief prevails as to the medicinal property of elephant flesh boiled in mustard oil This probably from the theory of signatures is viewed as a sovereign remedy for Barbados leg—the *dail fil* of the Arabs (*Ainslie*)

**MEDICINAL
USES,
I47****IVORY****IVORY
I48**

Reference has been made to the fact that the Ceylon elephant frequently has no tusks In India a tuskless male is called a *mukna* The tusks of the Asiatic species are considerably less than the African The largest Indian tusk on record is that obtained by **Sir Victor Brooke** The animal from which this was obtained had the left tusk diseased but the right one measured (outside curve) 8 feet length of part outside the socket or nasal bones 5 feet 9 inches greatest circumference 1 foot 4 9 inches and weight 90 lb **Sanderson** states that the largest tusks of elephants shot by him measured respectively 4 feet 11 inches and 5 feet in length outside curve 16½ inches in circumference at the gum weight 74½ lb the pair As a rule tusks show barely one half of their total length outside the jaw of the living animal The length within and without the nasal bones is generally exact but the lip or gum hides a few inches of the projecting half As the sockets or nasal bones of a large elephant are from 1 foot 6 inches to 1 foot 9 inches in length this admits of an elephant—having a tusk 3½ feet long of which 1½ foot (the gum hides about 4 inches) is visible (*Sanderson*) Tusks if once lost are never renewed and if in cutting off the tips too much be removed thus endangering the hollow lower portion the tusk is completely destroyed One tusk is generally considerably longer than the other from the habit of the animal in using one more than the other The Indian elephant is not hunted expressly for its ivory and consequently the trade in Indian ivory is comparatively speaking limited During the past five years the exports of Indian ivory have averaged in value from Rs 44 635 to Rs 73 315 India however imports a large quantity of African ivory and does a considerable trade in exporting this foreign ivory to other countries During the past five years the imports of foreign ivory have been valued at from Rs 19 01 258 (the lowest annual valuation) to Rs 31 24 861 The re-exports of this foreign ivory during that period have averaged from Rs 46 164 to Rs 18 24 670 The traffic in this foreign ivory is mainly concentrated in Bombay the supply coming from Zanzibar and the East Coast of Africa The exports of Indian ivory are almost exclusively from Bengal and Burma The

**TRADE IN
INDIAN
IVORY
I49**

The Lesser Cardamom

(G Watt)

ELETTARIA
Cardamomum

above are the figures published by Government of unmanufactured ivory but India also imports a large amount of ivory goods which in the trade returns appear as manufactured ivory This trade may approximately be put down as valued at a lakh and quarter of rupees Almost the entire traffic in manufactured ivory passes between the United Kingdom and Bombay

It is said that Indian ivory has an opaque dead white colour and manifests a tendency to become discoloured The Ceylon ivory is distinguished by fine grain small size and pearly bluish tint Siam ivory is in the trade regarded as much superior to the Indian in appearance and density It has been remarked of Africa that the nearer the equator the smaller the elephants but the larger the tusks The finest transparent ivory is collected along the West Coast between latitudes 10 N and 10 S The best white ivory is obtained from the East Coast African ivory is said to be best when recently cut It has a mellow warm transparent tint as if soaked in oil and has very little appearance of grain or texture It is reported that England alone imports 1 200 000 lb of ivory to obtain which 30 000 elephants have to be annually killed and the world's supply must it has been estimated necessitate 100 000 being annually slaughtered It may safely be assumed that if this rate of destruction continues a comparatively few years will suffice to exterminate the African species of elephant Should such a calamity be ever brought about it is to be hoped the advances of civilization may have discovered substitutes of sufficient merit to prevent the demand for ivory being diverted into Asia since though fairly plentiful at present a very few years would suffice to exterminate the Asiatic species and thus in time deprive the world of any living representative of the largest terrestrial animal

TRADE IN
INDIAN
IVORY

Annual
slaughter to
obtain Ivory
150

ELETTARIA, *Maton Gen Pl, III 646*

[t 267 SCITAMINEÆ

Elettaria Cardamomum, *Maton Bentley & Irimen Med Pl*

151

The LESSER CARDAMOM MALABAR CARDAMOM *Eng ; CAR*
DAMOME, Fr CARDAMOMEN Germ

Syn — ALPINIA CARDAMOMUM Roxb

Vern — *Choti el chi ilayechi chhoti ilayechi* HIND *Ilachi ilachi elavch*
gujrati elachi BENG *Ilachi* PB *Elechi* KHANDESH *Ilachi chhoti*
ilachi DEC *Elchi* GUJ *Ilachi malabari elachi elchi veldode* BOMB
Velloda MAK *Fillakay aila cheddi ellaay elu-hs ela kay elakay*
virai TAM *Fillakay elaki che'tu sanua elaki ellaay ela kuya elakaya*
vittula TEL *Yalakki, yetaki yerakki* KAN *Flettari ailum chedy*
MALABAR *Panlat pala or bu la phala bhala* BURM *Fnsal enasal*
SING *Upakunchika ela* (according to U C Dutt) and the following
as given by Roxburgh — *Prithweeka chundruvula ela mshkooti*
bahoola SANS *Kakilahe saghar* and the following given by Moodeen
Sheriff — *Qagilah qagilahe sighar hel hel bava kh-asr bava shoshmir*
ARAB *Kakilahe khurd* PERS

References — Roxb *Fl Ind Ed C B C 24* Voigt *Hort Sub Cal*
568 ; Thwaites En Ceylon Pl 318 Dals & Gibs *Bomb Fl Supp*
86 Grah *Cut Bom Pl, 206* Stewart *Pb Pl 238* Rhoads *Hort*
Mal XI tt 4 & 5 Elliot *Fl Andhr 49 197 ; Memor on Carda*
mom cultivation in Coorg by E Ludlow in 1868 Voyage of John
Huygen van Lanschoten to India published 1596 Vol II 86-88 *Pharm*
Ind 230 ; O Shaughnessy Beng Dispens 651 ; Moodeen Sheriff Supp
Pharm Ind 88 and 134 U C Dutt *Mat Med Hind 257* Dymock
Mat Med W Ind 2nd Ed 786 Fleming *Med Pl and Drugs as*
in As Res Vol XI 136 ; Fluch & Hand Pharmacog 643 U S
Dispens 15th Ed 361 Bent & Trim *Med Pl 267* S Arjun
Bomb Drugs, 141 ; Med Top Ajmr 138 K L Dey *Drugs of*

ELETTARIA Cardamomum

The Lesser Cardamom.

Ind 51; *Baden Powell Pb Pr* 300 301; *Drury U Pl* 191 *Iisboa U Pl Bomb* 176 *Spons Encyclop* 11 1803 *Balfour Cyclop* 1 1042 *Smith Dic* 92 *Treasury of Bot* 1 446, *Kew Off Guide to Bot Gardens and Arboretum* 62 *Ind For X* 287 *Mys & Coorg Gas* 1 124 125 11 411 *Ind Agrs IX* 43 *Mason Burma and its People* 496 804 *Madras Manual, Vol II* 135 *Nicholson Man Coim batore Dist* 407 *Special Report by Collector, Madura Rail born Trade Report of Bombay* 1881-82

Habitat—A large perennial herb with a thick fleshy or woody rhizome from the upper part of which are given off the horizontally spreading flowering and fruiting stems. It is indigenous in West and South India growing abundantly in the rich moist forests of the hilly tracts of Kánara Mysore Coorg Travancore and Madura. Mr Ludlow mentions it as a native of the hilly parts of Cochin China Travancore Malabar Coorg Munjerabad and Nugur. It is extensively cultivated in many other parts of South India at elevations from 2 500 feet to 5 000 feet. It grows wild also in many parts of Burma and in the Bhamo District is said to be cultivated in sufficient quantity for local consumption.

HISTORIC NOTE—It is worth mentioning in this place that Linschoten in the Journal of his Indian Travels (*Published in 1596*) describes two forms of Cardamoms as used in South India. These he calls the Lesser and the Greater Cardamom. It would thus seem that 300 years ago as at the present day the Nepál Cardamom was carried all over India. Cardamom is in Sanskrit known as *Ela* and is mentioned by *Susruta* so that it must have been used by the Hindus from a very remote period. The early Arabian writers were acquainted with it and the more recent Muhammadan authors speak of the Cardamom under the names of *Kakulah* and *Hil*. Dr Dymock referring to the first European knowledge of Cardamoms says—When they were first introduced into Europe is doubtful as their identity with the Amomum and Cardamomum of the Greeks and Romans cannot be proved. Garcia thinks that the Amomum of the ancients was the *Hamama* of the Arabs a drug still to be found in the Bombay shops and which appears to be a species of *Sphagnum* it is figured by *Olusius*. Muhammad Hussain gives *katidau*s as the Greek and *sharfiyun* and *shusma* as the Syrian names for the Cardamom. He describes two forms—the large and the small. Of the Lesser Cardamom Linschoten wrote that it most groweth in Calicut and Cananor places on the coast of Malabar. Commenting on Linschoten's account of this spice his contemporary Dr Paludanus wrote that according to *Avicenna* there are two kinds of Cardamoms—the Greater and the Lesser. He then adds that to the ancient Greeks such as *Galen Dioscorides* and others it was unknown and although *Galen* in his *seventh book* of simple saith that Cardamomum is not so hot as *Nasturcium* or water cresses but pleasanter of savour and smell with some small bitterness yet those signes or properties doe not agree with the Cardamomum of India. *Dioscorides* in his first booke and fifth Chapter commending the Cardamom brought out of Armenia and Bosphorus (although hee saith also that such doe growe in India and Arabia) saith that we must choose that which is full and tough in breaking sharp and bitter of taste and the smell thereof causeth a heavinesse in a man's head yet is the Indian Cardamomum caryed into these places from whence *Dioscorides* affirmeth that his Cardamomum doeth come although it be neither tough in breaking nor annoyeth the head neither is bitter of taste nor so sharp as cloves. Thus *Paludanus* held the opinion that has since become current in the literature of the subject that the Amomum and Cardamomum of the ancient Greeks was not the spice of India.

HISTORY
152

E 152

The Lesser Cardamom (G Watt)

ELETTARIA
Cardamomun

CULTIVATION

CULTIVA-
TION
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There are two ways of propagating this plant *vis* by bulus (or rather rhizomes) and by seed. The chief requirements for successful cultivation are a rich loamy soil and a site sheltered from strong winds and too much direct sunlight. Clearings in forest land with a few trees left here and there in order to give the requisite shade and shelter are found to offer the best conditions for the production of good crops. In the planting of bulbs young ones of one to two years old should be chosen. Holes one foot deep and 18 inches wide are dug and into these after they have been prepared as beds raised a few inches above the surrounding ground the bulbs are inserted just below the surface of the soil.

The spaces between each plant may be 6 feet to 12 feet, according to the quality of the soil. The ground should be well cleared of weeds, stones and rubbish but when the plants have grown to a certain size no further weeding will be necessary as nothing will grow under their shade. Seeds should be sown in prepared nurseries care being taken not to sow too deep. The seedlings when 6 to 8 inches in height should be transplanted and treated as directed for bulb propagation. Several writers have recommended an artificial germination of the seeds in a closed tin case the lid of which is kept tight so as to exclude air and light as much as possible. The seeds are placed on a piece of flannel and kept moist from a saturated layer of soil below. On germination the seeds according to this process are recommended to be dusted off the flannel on to a prepared nursery bed by striking the flannel on the reverse side and thereafter thinly covered with soil.

Planting

It may be as well to give here a few passages from the more important authors regarding the various localities where the plant either occurs wild or exists in that state of cultivation which Mr Ludlow very appropriately describes as a singular kind of jungle horticulture. Compiling largely and admittedly from Mr Ludlow's interesting paper the learned authors of the *Pharmacographia* (p. 644) give the following brief abstract of the system as pursued in South India generally —

Previous to the commencement of the rains the cultivators ascend the mountain sides and seek in the shady evergreen forests a spot where some cardamom plants are growing. Here they make small clearings in which the admission of light occasions the plant to develop in abundance. The cardamom plants attain 2 to 3 feet in height during the following monsoon after which the ground is again cleared of weeds, protected with a fence and left to itself for a year. About two years after the first clearing the plants begin to flower and five months later ripen some fruits but a full crop is not got till at least a year after. The plants continue productive six or seven years. A garden 484 square yards in area four of which may be made in an acre of forest will give on an average an annual crop of 12½ lb of garbled cardamoms. Ludlow an Assistant Conservator of Forests reckons that not more than 28 lb can be got from an acre of forest. From what he says it further appears that the plants which come up on clearings of the Coorg forests are mainly seedlings which make their appearance in the same quasi spontaneous manner as certain plants do in the clearings of a wood in Europe. He says they commence to bear in about 3½ years after their first appearance. The plan of cultivation above described is that pursued in the forests of Travancore Coorg and Wynaad. On the lower range of the Pulney Hills near Dindigul at an elevation of about 5000 feet above the sea the cardamom plant is cultivated in the shade. The natives burn down the underwood and clear away the small trees of the dense moist forests called sholas which are damp all the year round. The cardamoms are then sown and when a few inches high

SOUTH INDIA
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Coorg

WYNAAD.

ELÆTTARIA
Cardamomum
The Lesser Cardamom
**CULTIVA-
TION**
**Cochin and
Travancore**
**MYSORE
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are planted out either singly or in twos under the shade of the large trees. They take five years before they bear fruit. In October remarks our informant I saw the plants in full flower and also in fruit the latter not however ripe. In North C  nara and Western Mysore the cardamom is cultivated in the betel nut plantations. The plants which are raised from seed are planted between the palms from which and from plantains they derive a certain amount of shade. They are said to produce fruit in their third year. Cardamoms begin to ripen in October and the gathering continues during dry weather for two or three months. All the fruits on a scape do not become ripe at the same time yet too generally the whole scape is gathered at once and dried to the manifest detriment of the drug. This is done partly to save the fruit from being eaten by snakes, frogs and squirrels and partly to avoid the capsules splitting which they do when quite mature. In some plantations however the cardamoms are gathered in a more reasonable fashion. As they are collected the fruits are carried to the houses laid out for a few days on mats then stripped from their scapes and the drying completed by a gentle fire heat. In Coorg the fruit is stripped from the scape before drying and the drying is sometimes effected wholly by sun heat. In the Native States of Cochin and Travancore cardamoms are a monopoly of the respective Governments. The Raja of the latter State requires that all the produce shall be sold to his officials who forward it to the main d  p  t at Alapalli or Aleppi, a port in Travancore where his commercial agent resides.

The cardamoms at Aleppi are sold by auction and bought chiefly by Moplah merchants for transport to different parts of India and also through third parties to England. All the lower qualities are consumed in India and the finer alone shipped to Europe. In the forests belonging to the British Government cardamoms are mostly reckoned among the miscellaneous items of produce but in Coorg the cardamom forests are now let at a rental of   3,000 per annum under a lease which will expire in 1878. Dr. Oleghorn, late Conservator of Forests in the Madras Presidency, observes in a letter to one of us that the rapid extension of coffee culture along the slopes of the Malabar Mountains has tended to lessen the production of cardamoms and has encroached considerably upon the area of their indigenous growth. A recent writer has shown from his own experience that the cultivation of the cardamom is a branch of industry worthy the attention of Europeans and has given many valuable details for insuring successful results.

Mysore and Coorg—Rice's *Gazetteer* (I 124) gives the following description which will be found to amplify the facts narrated in the above passage—

Cardamoms are propagated entirely by cuttings of the root and spread in clumps exactly like the plantain tree. In the month following the autumnal equinox a cluster of from three to five stems with the roots adhering are separated from a bunch and planted in the same row one between every two areca nut palms in the spot from whence a plantain tree has been removed. The ground around the cardamom is manured with *nelli* (*Emblica*) leaves. In the third year about the autumnal equinox it produces fruit. The capsules are gathered as they ripen and are dried four days on a mat which during the day is supported by four sticks and exposed to the sun but at night is taken into the house. They are then fit for sale. Whenever the whole fruit has been removed the plants are raised and all the superfluous stems and roots having been separated they are set again but care is taken never to set a plant in the spot from whence it was raised a change in this respect being considered as necessary. Next year these plants give no fruit but in the year following, yield

The Lesser Cardamom

(G Watt)

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Cardamomum

capsules again as at first After transplantation the old stems die and new ones spring from the roots Each cluster produces from a quarter to one seer weight of cardamoms

The Collector of the Madura District reports in a recent communication that the seeds are there sown from the beginning of July to the end of October in small plots prepared for the purpose by weeding and hoeing The young plants after having attained a height of about four inches are carefully transplanted into pits They are again when about one foot high removed to pits one foot square which have been prepared one or two months previously The plants begin to yield in the fourth year and the fruit is picked in the months of November and the earlier half of December The average crop in the first year of fruit is about 10lb in the second 15lb and so on till a maximum of 25lb is reached

Speaking of the tradition which prevails in Coorg regarding cardamom cultivation Mr Ludlow remarks The Coorgs relate that in the olden times the cardamom plant was seldom met with in their jungles The seeds being very agreeable to taste the plant was much sought after In course of time people noticed that it only grew in places where the ground had been shaken by the fall of some large tree or of a large branch thrown down by the force of the wind especially when this had happened a short time previous to the falling of the annual showers in March and April In imitation of nature during the months of February and March they selected in these jungles the largest trees and felled them previously cutting down all the smaller surrounding trees and brushwood that would otherwise have lessened the shock given to the ground By these means the plants increased The people gradually became more and more acquainted with their requirements

"The Coorgs have many signs by which they are more or less influenced when selecting sites for new gardens Many know the good jungles by tradition from their ancestors who had a better knowledge of them than the present generation; for in the days of the wars with Hyder and Tippoo they often were obliged to fly for safety into the recesses of their

Males They will in a doubtful jungle in the month of February here and there fell a few trees and judge the following year of its capabilities as a cardamom jungle by the presence or absence of young cardamom plants near to the felled trees

Travancore—In the *Madras Manual* a short notice will be found regarding cardamom cultivation in Travancore State It is there stated that in the hills the cardamom grows spontaneously in the deep shade of the forest it resembles somewhat the turmeric or ginger plant but grows to a height of 6 to 10 feet and throws out at the roots the long shoots which bear the cardamom pods The owners of the gardens early in the season come up from the low country east of the ghats cut the brushwood and burn the creepers and otherwise clear the soil for the growth of the plants as soon as the rains fall They come back to gather the cardamoms when they ripen about October or November It is further said to be an uncertain crop being greatly dependent on the rains In the *Madras Mail* there appeared the following particulars regarding cardamom cultivation in Travancore —

There are two varieties of this crop caused by difference of rainfall and soil one crop comes to maturity in October and the other in January The former grows in a wet climate and a poor soil while the other flourishes in a dry climate and fine rich soil The writer's experience is confined to the latter variety This plant will grow only at certain places and the presence of a few wild plants safely indicates that the soil will suit the cultivation of cardamoms In April the ground should be cleared

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of all undergrowth and the seed sown before the monsoon. In October when the young cardamoms sprout up it is necessary to thin them out where they are too much crowded and where the ground is sparsely grown it should be sown with seed. For two years nothing more is to be done. In the third year the plantation should be weeded and the small crop gathered. In the fourth year the garden should be thoroughly weeded and as it is by this time in full bearing a close attention should be paid to it. 'Cardamoms require light showery weather in March and April when the flowering scapes are ready to blossom and the absence of this at the proper time almost ruins the crop. Cardamoms ripen in November and are liable to be damaged by rats, snakes and vermin of every description.

The scapes with the cardamoms are removed from plants, the capsules are then carefully removed from the scapes and dried on the rocks. The fruits soon lose their green colour and are then ready for the market.

The fruit sells at the coast at R4 per lb (Dutch) but the grower gets only a third of this.

A little care on the part of the Travancore authorities has brought up the total produce to 1500 cwt which was formerly only a few cwt.

Roughly estimated about 20000 acres were under cultivation and there is land available for extending the cultivation five fold.

The yield per acre in even favourable time does not exceed 20 to 25 lb of cardamoms.

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Bombay—The following special report has been furnished for the present work by the Officiating Director of Land Records and Agriculture —

Cardamoms are grown in Kánara only. In 1887-88 that crop occupied 899 acres. It is common in the hill gardens of North Kánara. It requires plenty of water. In a new garden Cardamoms are grown from seed and in an old one from cuttings. The seed is sown in October after the outer shell is removed. It must be carefully sheltered from the sun and it takes three months to sprout. When the seedlings are a foot high they are transplanted and a year and a half later they are set in shady places among betel palms and begin to bear when three years old. In Sirsi about 1000 seedlings go to an acre while in Yellapur the number of seedlings required to plant an acre of land is 650. The pods commence ripening in September and October and are gathered till the end of February or the beginning of March. There are about 17 pickings more than half the pickings having an interval of a week between them while the rest from a fortnight to three weeks. The acre yield varies from 7 to 28 lb. The pods after they are dug out of the ground are dried four days on a mat which during the day is hung in the sun and at night is taken into the house. The pods are then fit for sale. When the whole crop has been picked the plant is taken out of the ground, the useless wood and roots are cleared away and it is again planted in a fresh hole. The year after it has been moved the plant yields no fruit but in the following year it again bears. After the plant has been removed the old stem dies and a new stem springs from the root.

As Cardamom is never grown by itself it is very difficult to ascertain accurately the cost of cultivation. As a rule it is grown in spice gardens containing betel nut palms, betel and pepper vines and plantains. In an experiment conducted in a good specimen of the highest class of spice garden in full bearing Mr J H Todd O S estimated the cost of cultivation per acre at R90. To this must be added R45 being a moiety of wages for watching, weeding and taking care of the garden. Thus the amount of charges per acre comes to R135. By the same experiment the value of produce—114 lb—comes to R326. Mr Todd's details of the

Cost of
cultivation
yield &c

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cost of cultivation and profit are more reliable than those given in the *Kanara Gazetteer*

Bleaching of Cardamoms - Though local taste appears to prefer them unbleached a good market is found for doctored Cardamoms as far as Bombay and Bangalore and for this purpose a considerable proportion of the Cardamoms produced in Kánara is taken to Haveri and Dharwar to be bleached with the aid of the water of the well which is supposed to have the virtues of bleaching and improving the flavour of Cardamoms. The well belongs to a Jangam or Ling ayat priest. He makes no charge for its use though it is said that he receives occasional voluntary presents from the Cardamom dealers.

With a view to ascertain whether this well had really the virtues ascribed to it samples of its water were subjected to analysis by Dr Lyon, Chemical Analyser to Government and Dr Oooke, Principal College of Science Poona. Both think that the so-called virtues of the water are totally fanciful. The Chemical Analyser reported - I have examined a sample of water stated to be a specimen of that used at Haveri for washing Cardamoms. The sample yielded to analysis the results shown below. I was unable to detect in the water the presence of any special constituents such as would account for the reputation stated to be possessed by it of being a water specially suited for washing Cardamoms -

ANALYSIS	Grains per gallon
Total solids by evaporation	427 00
Chlorine	110 60
Sulphuric acid	36 38
Silica	2 59
Alumina	4 27
Lime	60 20
Magnesia	34 44
	<u>675 48</u>

Mr E O Ozanne OS who in 1885 saw the whole process of bleaching describes it as follows - Water from the well is drawn and taken to a suitable room. A large earthen ware vessel is filled with the water into which pounded *antalkai* (the fruit of the soap nut *Sapindus trifoliatus*) and *sikikai* (*Acacia concinna*) in the proportion of 2 lb of the former to $\frac{1}{2}$ lb of the latter for about 5 gallons of the water are placed and well stirred. Another vessel contains a strong solution of common soap in the water of the well. The mixture containing 2 lb of pounded soap nut and $\frac{1}{2}$ lb of *sikikai* supplies for 5 mans (1 man = 26 lb) of cardamoms.

Two women seated on tripods place a wide mouthed earthen ware vessel between them - the washing tub as it may be styled. Eight *lota* fulls of the well water (a large supply of which is kept at hand) are poured into the tub and three *lota* fulls of the soap nut *sikikai* mixture. The *lota* holds about one quart of water.

The tub then receives a basketful of cardamoms weighing 10 lb. The two women plunge their hands into the tub and stir vigorously for about one minute and then suddenly rest for about the same length of time and again stir for another minute. A thick lather results. This completes the first washing. The cardamoms are baled out by hand and transferred to a basket where they remain a few seconds till the water has drained off. The basketful is received by two other women sitting on tripods with a washing tub between them. This tub contains 7 quarts of the pure water, 1 quart of the soap-nut and *sikikai* mixture and one of the soap solution. The cardamoms are stirred as in the first washing with the same interval of rest and are baled out into another basket. When the

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water is drained off the washed cardamoms are thrown on to a mat. The heap becomes large after a few hours work. A woman is exclusively in charge of it and continually sprinkles the well water over it. She is relieved at night by another woman who sprinkles the heap till morning once every half hour.

Bleaching

Next day when the sun has risen the heap is carried to the flat roof of the house and the cardamoms are spread on mats for four or five hours to dry. The next operation is to nip off the short stalks. This is done by women sitting in the house. Each woman has a large pair of English scissors. She squats on the floor and rests her right hand which holds the scissors on the floor and feeds the scissors with her left hand. The pace at which this nipping is done astonished me. The stalk is very small and care must be taken to cut it off without injury to the cardamom itself. I saw an old woman nip 90 cardamoms in one minute.

This done the sorting begins. The small ill shapen cardamoms are separated and only the well rounded ones packed for export to distant markets. A woman sorts a *man* per diem.

I must now return to the first washing. The mixture in the tub after the first basketful has been baled out is replenished by two or three quarts of the well water and a second basketful washed. The tub is then emptied and a fresh mixture made. The mixture for the second washing also does duty for two basketfuls. The women who wash the cardamoms are paid 3 annas per diem. An ordinary wage is $1\frac{1}{2}$ to 2 annas. The night watcher receives 4 annas. The nipping is paid for by the piece at the rate of $\frac{1}{2}$ anna per *padu* (10 *padis* = 1 *man* = 26ll). It is said that an expert can earn $2\frac{1}{2}$ annas per diem. She must clip 13lb therefore all other hands employed are paid by the day at 2 annas.

Starching

Besides this bleaching now a days cardamoms are starched. Starching was first introduced at Sirsi where bleachers had recourse to it as they had to compete with the bleachers at Haveri who were experts in the art of bleaching and who had established their fame as such. The starched cardamoms look whiter than the ordinary bleached cardamoms of Haveri and the bleachers of Haveri have therefore now taken to starching. The starch is prepared by pounding together rice, wheat and country soap with butter milk. The paste is dissolved in a sufficient quantity of water and the solution is sprinkled over the cardamoms to be starched as they are being rubbed by the hand.

It may be worth adding in connection with North Kánara that Mr Talbot in his interesting paper on the trees and shrubs of that district makes no mention of the wild cardamom from which circumstance it may be inferred as not indigenous. In the *Bombay Casetteers* brief notices are given regarding the cardamom. Of Khandesh it is said to be grown in sufficient quantity to meet local demand but that there is no export. It is also mentioned as one of the thirteen spices which are grown in Kolhapur.

AREA OF CULTIVATION PRICES &c
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The total area under cardamoms cannot be definitely determined though it may be affirmed that the crop is chiefly raised in the portion of the mountainous tract of the southern or south western extremity of India. The chief districts in the Madras Presidency and the areas under the crop during the past three years were Madura (1885-86 1 200 acres 1886-87 1 000 acres, and 1887-88 1 800 acres) South Canara (1885-86 1 000 acres 1886-87 1 800 acres and 1887-88 1 400 acres) and Malabar (1885-86 1 500 acres 1886-87 1 800 acres and 1887-88 2 000 acres). In Mysore cardamoms are mainly grown in the Kadur District the area under the crop having in the corresponding years to the above, been 1 600, 2 300 and

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(G Watt)

ELETTARIA
Cardamomum.

2 200 acres In Coorg the crop rarely occupies much over 300 acres Thus in Southern India according to the published statistics there were 7 700 acres in 1887 88 and 5 590 acres in 1885 86 According to these returns the area under cardamoms has increased while it will be found the foreign exports have decreased but the imports greatly increased There are many other features of the cardamom trade which appear contradictory so that in compiling from existing literature it is difficult to decide the course to be pursued It is hoped therefore that this admission may suggest the desirability of another original enquiry such as that published by Mr Ludlow in 1868—an enquiry which would place more recent information in the hands of the public One of Mr Ludlow's correspondents while commenting on the rise of prices accounted for this by saying the demand for coffee land had contracted the area available for cardamoms He wrote Cardamoms come to our market (Cochin) chiefly from the Travancore State with a small portion from the Cochin hills That grown in Wynaad very seldom finds its way to our market When we say that there is scarcely ever any stock on hand you will understand that purchases are made from immediate shipment—

Quantity brought for sale at Calcut			Mds
Ditto	exported from Madras	January to November 1867	1 100
	Ditto	ditto 1866	708
	Ditto	ditto 1865	988
	Ditto	ditto 1864	1 884
			1 882

Cardamoms are gradually becoming scarcer as the land is cleared and consequently dearer Prices in the country have more than trebled themselves in the last three years Present quotations are R88 to R100 per maund at Cochin and Calicut The price realized at home 5s to 7s 6d per lb Home charges averaged about 5d per lb last quotation 5s 6d to 7s 6d Cardamoms are sorted according to size and colour but unlike coffee and colonial produce generally the small sized ones provided they are plump are considered the best The large lanky ones form class No 2 Discoloured empty ones (or nearly so) constitute triage The quality of the seeds varies very much according to the locality of the plant Cardamoms are usually distinguished by the places of their growth and valued accordingly At present it is not judicious to ship good cardamoms from the eastern coast but no doubt when brands become known the port of shipment will no longer be so much thought of According to *Spon's Encyclopædia* the price of Madras cardamoms ranges from 1s 6d to 7s a pound while good Malabar fetches from 6s to 9s 6d and inferior 2s to 7s 6d and Ceylon from 2s 6d to 5s 6d Dr Trimen in his *Systematic Catalogue of the Flowering Plants and Ferns of Ceylon* speaks of the Ceylon Cardamom as *Elettaria Cardamomum*, *Maton var major*—the *ensl* of the Singhalese The cardamoms of Ceylon are much larger than those of India but this fact should not be confused with the statement made above that the Greater Cardamom of Bengal and Nepal is *Amomum subulatum* and the Lesser Cardamom of South India *Elettaria Cardamomum*, two widely different plants

TRADE

The trade in Indian cardamoms seems to have been declining for some years past In 1880 81 the exports to foreign countries were valued at R8 20 257 but the returns for that year were the highest on record For subsequent years they were as follows —1883 84 R5 68 334 1885 86 R5 60 012 and 1887 88 R2 04 858 In 1883 84 the United Kingdom received of the above cardamoms to the value of R4 05 649 but last year only R52 658 After the United Kingdom the other receiving

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**ELEUSINE
ægyptiaca**

The Lesser Cardamom The Makri Millet

TRADE

countries are generally in the following order of importance — Arabia Germany Aden and Persia On the other hand the *imports* of Foreign Cardamoms seem to be on the ascendant In 1880-81 they were valued at R4 134 and taking the same years as have been given for the exports these imports were in 1883 84 R18 351, 1885 86 R2 205, and 1887 88 R2 60,450 During the last mentioned year the bulk of the imports (*viz* R2 51 211 worth) came from Ceylon and of the total of these foreign imports Bombay received R2 16 455 worth The coast wise imports and exports (*e.g.* the inter provincial trade by sea) were valued at over 10 lakhs of rupees so that excluding the trans frontier trade by land and the railway road and river borne transactions (the exact figures for which cannot be discovered) the total Indian trade in cardamoms was last year valued at R25 11 053 But it must be added that it is not known how much of these figures of Indian trade in cardamoms relate to the Greater or Nepal Cardamom (see *Amomum subulatum*) though of course the bulk of the transactions especially in South India and Ceylon must be in the Lesser Cardamom the fruits of the plant presently under consideration

**OIL
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Oil — An essential OIL is extracted by aqueous distillation It is of a pale yellow colour about 5 per cent being generally obtained it possesses the flavour and odour of Cardamoms and is said to be distilled to some extent in Madras

**MEDICINE
Seeds
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Medicine — The SEEDS are agreeably aromatic but their chief medicinal use is as an ingredient in compound preparations They are used as a corrective for foul breath Finely powdered they are administered as a snuff for headache The cardamoms fried and mixed with mastiche and milk are employed internally in irritation of the bladder In nausea and vomiting they are used as a *sherbut* with pomegranate and in cholera they are resorted to as a stimulant (*Dr Emerson*) As the seeds rapidly deteriorate on exposure they should not be removed from the capsules until required for use

SPECIAL OPINION — § Carminative employed with other aromatic drugs (*Assistant Surgeon Shib Chandra Bhuttichary, Chanda Central Provinces*)

**FOOD
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Food — Cardamoms are used by the natives in flavouring sweetmeats and certain cooked dishes also as a spice and are sometimes chewed in *pan* with betel leaf

**ELEUSINE, Gærtn Gen Pl, 1172 [GRAMINEÆ
(J F Duthie)**

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Eleusine ægyptiaca, Pers; Duthie Fodder Grasses N Ind 56

Syn — CYNOSURUS ÆGYPTIACUS Linn DACTYLOCTENIUM ÆGYPTIACUM Willd

Vern — *Makra makri* HIND *Kakuriya* URIYA *Suntu bukrui* SAN TAL *Cavara pullu* MAL (S P) *Maka makna tipakra* BUNDEL *Madana chimbari chubrei bhobra madhana kar madhana* PB *Malicha maligha mansa* RAJ *Mathna chikara chota mandiya ute-sirkum ute siria* C P *Mhar nachani natchni nagli raj* BOMB *Tamida sodee* TAM *Muttengapilloo* TEL *Putu tana* SING

References — *Roxb Fl Ind Fd C B C 116 Voigt Hort Sub Cal 712 Thunastes Fn Ceylon Pl 371 Stewart Pb Pl 254 Atchison Cat Pb and Sind Pl 167 Tri nen Hort Zeyl 110 Rheede Hort Mal XII 131 t 69 Lisboa U Pl Bomb, 208 Royle Ill Him Bot 421*

Habitat — A perennial grass with stems erect or creeping and rooting at the nodes It is plentiful all over Northern India, especially on cultivated ground

Medicine. — A decoction of the SEEDS is renowned in Africa as an

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The Marna Millet.

(♀ F Duthie)

ELEUSINE
Coracana

alleviator of pains in the region of the kidney and its herbaceous parts are applied externally for the cure of ulcers (*Le Maout and Decussne Descriptive and Analytical Botany Eng Trans 891*)

Food—The SEEDS are eaten by the poorer classes especially during times of scarcity

Fodder—It is generally considered to be a very nutritious fodder grass for cattle being both fattening and milk producing

Eleusine Coracana, Gaertn Duthie Fodder Grasses N Ind 57

Syn.—CYNOSURUS CORACANUS Linn

Vern—*Marud* BENG *Kode* SANTAL *Mandud marud makra rotka* N W P & OUDH *Mandal chaldra* PB *Kodon koda kodra kutra* PB HIM *Nangli nachni* SIND *Nangli nagli* BOMB *Nagli nachni* MAR *B rto nagli* GUZ *R g* SOUTHERN INDIA *Kayur kelvaragu* TAM *Tamidelu ragulu* TEL *Ragi* KAN *Aurakkan* SING *R jka* (according to **Piddington**) *ragi* (according to **U O Dutt**) SANS *Mandwah* PERS

References—*Roxb Fl Ind Fd C B C 115* *Voigt Hort Sub Cal 712* *Thnaistes En Ceylon Pl 371* *Dals & Gils Bomb Fl 97* *Stewart Pb Pl 254* *Aitchison Cat Pb and Sind Pl 168* *DC Origin Cult 11 384* *Fili t Fl Andhr 44 162 173* *Trimen Hort Zeyl 110* *Atkinson Him Dist 690* *Drury U Pl 193* *Duthie & Fuller Field and Garden Crops 11 10* *Lisboa U Pl Bomb 167* *Birdwood Bomb Pr 109* *Royle Ill Him Bot 420* *Church Food Grains of India 89* *Balfour Cyclop 1042* *Smith Dic 285 and 345* *General Alm Report Bengal 1882 83 12* *Report Agri Hort Soc Vol IV 54* *Bomb Gas XIII Part I 288* *Bomb Gas XVI 99* *Gas Ka nil 172* *Gas Simla 57* *Gas Mysore & Coorg 1 77* *Nicholson Man Coimbatore 220* *Special Report by Collectr Madura, Hunter Orissa 11 App IV 133* *Set Rep Bareilly 1874 88* *U C Dutt 268 314*

Habitat—A tall annual grass stems many erect or decumbent at the base and somewhat compressed At the summit of each stem are four to six digitate and usually incurved spikes It is largely cultivated as a rainy season crop and in many parts of India its grain constitutes the staple food of the poorer classes It is affirmed that the grain is never attacked by insects and will accordingly keep for any length of time

History—The facts stated by DeCandolle in his *Origin of Cult Pl* indicate a probable Indian origin for this millet In Egypt the ancient monuments bear no trace of its cultivation in early times and Græco Roman authors who knew the country do not speak of it It is mentioned by Sanskrit writers under the name of *Rajika* or *Ragi* the word **Coracana** comes from *kurakkan* its Ceylon name Its nearest ally in the wild state is **E ægyptiaca** an abundant and somewhat variable species luxuriant states of which sometimes bear a very close resemblance to the cultivated **E Coracana**

Varieties—There are several so-called varieties of this plant which differ chiefly according to their requirements as to soil and time of sowing Under the name of **E stricta** Roxburgh has described the form which has the spikes quite straight This kind requires a richer soil and is often surprisingly productive

CULTIVATION

As this millet is cultivated over the greater part of India it will be necessary to describe briefly the mode of growing it in certain typical regions

1 *Himālayan Districts*—Mr Atkinson says It is the staple autumn crop of the highlands (up to 8000 feet) between the Lons and the Sarda, and forms the main food resource of the agricultural classes It

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ELEUSINE
Coracana.

The Marua or Ragi Millet.

CULTIVA-
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gives a larger yield than other crops and is said to increase in bulk when ground qualities that have probably led to its more general cultivation as it is a poor and very coarse grain. *Mandua* is cultivated both in ordinary agricultural land and in freshly cleared jungle. In ordinary land it usually follows a wheat crop which is gathered in April-May and the land is at once prepared for the *mandua* in the same manner as for rice. The seed is sown broadcast and instead of a harrow the bough of a tree is drawn over the newly sown land to cover the grain. When the young plants have risen two or three inches the whole field is harrowed two or three times and the vacant spaces are filled up from those where the plants are in excess. Later on the crop is well weeded with the *kutala* and in October-November the ears of the *mandua* are cut off. It is generally sown as a mixed crop along with pulses &c known collectively as *Kán*.

PANJAB
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2 *Panjab* — In the Karnál District it is grown in fairly stiff soil but chiefly in the Khádar and then only in small quantities. It is sown in seed beds carefully dressed and manured. The seedlings are then planted out in land which has been twice ploughed and dressed with the *sohágga*. It is watered once or twice if the rains are late and weeded once. The heads ripen slowly and the ripe heads are picked off and the grain beaten out.

In dry seasons its cultivation as a food crop is largely increased it being put in fields intended for *siri* which can not be planted out owing to the drought (*Gas Karnal Dist 178*). In the Kangra District it forms an import.

N. W. PROV
INCES

3 *North Western Provinces and Oudh* — It is cultivated under two very different circumstances in these provinces. The most important position it fills is that of the chief food grain of the hill tracts on their northern border where it is very extensively cultivated. In Jaunsár Báwar it forms the chief article of food of the hill men and is grown on the very poorest soil often yielding a crop from mere stones and shingle. It is on the other hand very rarely grown in the hilly country to the south of the Provinces where its place is taken by *kodon*. But it is grown to a greater or less extent over the whole of these Provinces and in the more fertile districts its cultivation is often attended with considerable care and results in a very large weight of produce. It prefers light soils and is sown at the commencement of the rains at the rate of 10 lb of seeds to the acre. In the Allahabad and Azamgarh Districts it is reported to be occasionally sown in seed beds and transplanted like rice. In this case the seed is sown with irrigation in May and the seedlings are planted out when the rains break. It suffers greatly from heavy rain and a good year for rice is a bad year for *mandua* and vice versa. It should be weeded two or three times and when carefully cultivated often receives a top dressing of manure after the first weeding. The yield is the heaviest of any of the minor millets since not only is the gross weight of the produce large but only a small proportion of this weight consists of husk. In this respect *mandua* is the most profitable of the minor millets. With *sawan* and *kodon* for instance the husk contributes almost 50 per cent of the weight while with *mandua* it only amounts to 4 or 5 per cent. Where carefully cultivated 12 to 14 maunds of grain may be expected to the acre but in the hills a much smaller produce than this is gathered and cultivators would be content with 5 or 6 maunds' (*Duthie and Fuller*).

MADRAS.
177

4 *Madras* — In the Coimbatore District it is sown in nurseries and transplanted when a few weeks old to the fields. It is however best known as a garden crop and is sown generally in June or July in some localities it is a cold weather in others a hot weather crop. It is usually

The Marua or Ragi Millet. (*J F Duthie*)

ELEUSINE
Coracana

transplanted from the nurseries but is sometimes sown broadcast in the beds. It is called a four months crop and will produce up to 2 500 lb per acre. On dry land *ragi* is rare it is then grown chiefly near the hills where rain is more abundant and the soil is better. The land is well prepared by ploughing and manuring and the seed is sown broadcast with lines of castor dholl &c in furrows at 10 or 12 feet apart at about a month old it is interploughed and weeded. The *ragi* is harvested about four months after sowing and the dholl a month or two afterwards. Threshing is performed after it has been heaped to sweat when the grain becomes looser in the husk and is easily trodden out. It is reaped by cutting off the ears as they ripen leaving the straw standing till it is removed bodily and stacked. (*Extract from Nicholson's Manual of the Coimbatore District*) The Collector Madura reports that the sowings begin in July and end in November the reaping in November to February. The cost of cultivation is estimated at Rs 16-8 the outturn at Rs 18-12. It is often grown by irrigation and is suitable for any soil. The millet is used as food being prepared either as a cake with water or powdered and boiled.

Ragi yields a valuable food grain under moderate irrigation. It is easily grown and is extensively raised under wells during the hot season being planted out from seed beds. The best plan is to ridge up the land as is done for maize and cotton and to plant the seedlings on both sides of the ridges. The crop is a difficult and expensive one to harvest owing to the ears never ripening at one time and it is also costly to thresh the grain adhering with great persistency to the panicle. (*Saidapet Experimental Farm Manual and Guide*)

In the Trichinopoly District there were 153 614 acres under *ragi* cultivation in 1888. The crop is sown from May to August and harvested from September to December. In dry lands the annual outturn amounts to the value of Rs 9 the cost of cultivation being Rs 4-8 and the profit Rs 4-8. In wet lands the yield attains to the value of Rs 14 the cost of cultivation and profit being Rs 7 each. This crop is generally cultivated in black clay black loam and red soils. (*Report of H Willock Esq Collector of Trichinopoly*)

In the South Arcot District the land intended for *ragi* is first ploughed in January and at different times between the middle of July and the middle of August. Sheep are then penned on the land for manure and it is ploughed five or six times till the soil is reduced to a fine consistency. It is sown between the middle of August and the end of October. It is weeded after twenty or thirty days and a second time after sixty days. The crop is harvested from the latter part of December to the middle of January.

In the Cuddapah District during 1887-88 there were 115 087 acres under *ragi* cultivation. There are two kinds the one irrigated and the other un-irrigated. The former is planted for the seed beds in May and June and reaped in September while the latter is sown in September and reaped in January. The cost of cultivating the former kind is Rs 15 and the profit is Rs 10 and that of the latter is Rs 7 and the profit Rs 10 per *cawny*.

5 In Mysore *ragi* is by far the most important crop grown on dry fields and much care is taken in its cultivation. The soil which suits it best is red next black then ash coloured and the worst is that which contains much sand. A variety called *tota* or *nât ragi* and which will not thrive on dry lands is grown in certain parts of Mysore. A brief description of its cultivation is worthy of mention. Garden *ragi* is always transplanted and hence it is called *nât*. The following is the process followed in the Kolar District. For the seedling bed dig the ground in Pushya (December

CULTIVA-
TION.

MADRAS

MYSORE
178

ELEUSINE
Coracana**The Marua or Ragi Millet.****CULTIVA**
TION

January) and give it a little dung. Divide it into squares and let it have some more manure. Then sow the seed very thick cover it with dung and give it water which must be repeated once in three days. The ground into which it is to be transplanted is in Pushya ploughed five times and must be dunged and divided into squares with proper channels like a poppy garden. About the end of January water the seedlings well and pull them up by the roots tie them in bundles and put them in water. Then reduce to mud the ground into which they are to be transplanted and place the young *ragi* in it with four inches distance between each plant. Next day water and every third day for a month this must be repeated. Then weed with a small hoe and water once in four days. It ripens in three months from the time when the seed was sown and in a middling crop produces twenty fold. It is only sown on the ground at times when no other crop could be procured as the expense of cultivation nearly equals the value of the crop. (*Gas of Mysore and Coorg I 81*)

BOMBAY
179

6 *Bombay* — It is grown in the hill lands of the Násik District some times under the wood ash (*dalhi*) system. The seed is sown in burnt beds in the latter part of May the seedlings are planted out in June or July and the crop is reaped in October. It is widely grown in the hill forest country of Kánara and the grain is generally eaten by the poorer classes. It is the principal crop on the hill lands of the Thána District and is always cultivated as a first crop after a fallow. About twelve varieties are recognized half of them early ripening and the rest are late ripening. The former are ripe in September and the latter in October. The crop is similarly treated and holds an important position amongst the food grains in many other parts of the Presidency.

AREA UNDER ELEUSINE**AREA**

The total area for all India cannot be ascertained but the following are the areas returned as under the crop in Madras and Bombay for 1887-88 — Madras 1 551 000 acres Bombay 802 000 acres

CHEMISTRY
180

Chemical Analysis of the Grain — The following is the composition of *ragi* grain according to Professor Churchill —

	In 100 parts		In 1 lb	
	Husked	Whole	2 oz	0 grains
Water	13.2	12.5	0	413
Albuminoids	7.3	5.9	0	409
Starch	73.2	74.6	11	56
Oil	1.5	0.8	0	252
Fibre	2.5	3.6	0	182
Ash	2.3	2.6	0	

The nutrient ratio is here 1 : 13 the nutrient value 84. The percentage of phosphoric acid in the whole grain is about 0.4 (*Food Grains of India p 89*)

FOOD
181

Food — Though eaten largely by the labouring and poorer classes of people in many parts of India it is not considered to be very wholesome being somewhat difficult of digestion. In Mysore the flour is dressed either in the form of a pudding or is made into cakes fried in oil.

SPECIAL OPINION — § It forms the food of four fifths of the people of Mysore and is largely eaten by the working classes in Southern India. It enters into jail diet. It is a highly nourishing millet suited to working men. It sometimes produces diarrhoea but this is due to bad grinding and non separation of the coarse coating of the grain. (*Surgeon General W R Cornish F.R.C.S. C.I.E. Madras*)

FODDER
Straw
182

Fodder — The STRAW is considered excellent fodder for cattle and is said to improve by keeping. In the Mysore District cattle thrive and

Fodder Grasses	(<i>f</i> <i>F</i> <i>Duthie</i>)	ELEUSINE verticillata.
work on it alone without requiring gram which is not the case with respect to paddy straw Though considered heating it is sometimes given to horses when grass is scarce		
Domestic Use. —A fermented liquor called <i>bajah</i> or <i>bojals</i> is prepared from the seeds in the Mahratta country and a similar beverage either distilled into spirit or consumed as a kind of beer is manufactured on the Sikkim Himalaya and imbibed through a straw (<i>Hooker Him Jour.</i> I, 175)		DOMESTIC 183
Eleusine flagellifera, Nees <i>Duthie, Fodder Grasses N India, 57</i>		FODDER. 184
Syn. — <i>E. ARABICA</i> Hochst		
Vern. — <i>Chhimbar</i> HIND <i>Gurdub</i> N W P <i>Chemri chimbari chhem bar kharimbar dubra gathul ghanitl</i> (chubrei and bharn Trans Indus according to Stewart) <i>Pb Ganthia ganth dob RAJ</i>		
References — <i>Aitchison Cat Pb and Sind Pl 167 Journ Agri Hort Soc 1885 Vol VII New Series 237</i>		
Habitat. —A small creeping perennial grass found in many parts of Northern India more particularly where the soil is sandy		FODDER 185
Fodder —Affords very good fodder for cattle and horses and in parts of the Panjáb it is said to form the special food of donkeys		186
E indica, Gaertn <i>Duthie Fodder Grasses N India 57</i>		
Syn — <i>CYNOSURUS INDICUS</i> Linn		
Vern — <i>Mal ankuri</i> HIND <i>Gurchawa</i> BUNDEL <i>ghingri ghinjhor mahraila gadha gadha charwa gatha mandwa lihar</i> N W P & OUDH <i>Mandav KUMAON Mandwa RAJ Godchabba gurra gadi kakariya malanya mandial malghis C P Kuror karu chodi TEL Sin gno-myet hsen gno mveet BURM Wal kurakkan SING</i>		
References — <i>Roxb Fl Ind Ed CBC 116 Vigt Hort Sub Cal 713 Thwaites En Ceylon Pl 371; Aitchison Cat Pb and Sind Pl 168 Trimen Hort Zeyl 110 Elliot Fl Andhr 86; Aitchison Him Dist 691 Balfour Cyclop 1043; Mason, Burma and its People 478 818</i>		
Habitat —A small rather coarse-looking grass abundant on waste ground and by road sides all over India ascending to moderate elevation on the Himalayas also in Burma and in Ceylon		
Fodder —It is eaten by horses and cattle in Northern India and in some districts is considered to be a good fodder grass though Roxburgh says that cattle are not fond of it a remark which may however apply to the Bengal form which the nature of the climate would render more rank and less palatable In Australia and in North America it is highly spoken of as a pasture grass		FODDER. 187
E scindica, Duthie, Fodder Grasses N India 58		188
Syn. — <i>DACTYLOCTENIUM SCINDICUM</i> Boiss		
Vern. — <i>Mandjro</i> SIND; <i>Bhobra bobriya Pb Ganthya gants ghás jangli malicha kharo-makro RAJ</i>		
Habitat. —A slender perennial species confined to sandy tracts in Northern India		
Fodder —It is valued locally as a good fodder grass		FODDER 189
E verticillata, Roxb <i>Duthie Fodder Grasses N India 58</i>		190
Vern. — <i>Yharna, therna Pb Chhinke kurt chinke kangri RAJ</i>		
References. — <i>Roxb Fl Ind Ed CBC 116 Aitchison Cat Pb and Sind Pl 168</i>		
Habitat. —Resembles <i>E. indica</i> , but is taller, and has the spikes arranged in verticels		FODDER. 191
Fodder —It is said to be a good fodder grass for cattle both in the Panjáb and in Rajputana		

EMBELIA
Ribes**The Bayabirang**

192

ELIONURUS, Humb & Bonpl ; Gen Pl, III, 1129 [GRAMINEÆ
Elionurus hirsutus, Munro Duthie Fodder Gr N Ind 28 ;

Vern.—Bhanjuri N W P Sin sewan shewar, Pb ; Shinwan swan, gawán RAJ

References.—Atchison, Cat Pb and Sind Pl 173 Todd, Rájasthan, II 286

Habitat—A perennial grass 1 to 2 feet high, with silvery pubescent spikes of florets. It grows in sandy parts of the Panjáb also in Sind and Bundelkhand and is a characteristic plant of the Rájputána desert tract.

Fibre—The roots are said to yield a fibre used for weavers' brushes.

Food—Todd mentions that in Bikanir where this grass is abundant the seed is collected and mixed with bájra flour is largely consumed by the people.

Fodder—Nutritious and when young affords excellent grazing. Goldstream says it is a good stacking grass and will keep good for ten years.

FIBRE

Roots

193

FOOD

Seed

194

FODDER

195

Elm, see *Ulmus campestris*, Linn

ELSCHOLTZIA, Willd ; Gen Pl II 1181

196

Elscholtzia polystachya, Benth Fl Br Ind IV 643 LABIATEÆ

Vern.—Bhangria KUMAON Rangchari mehndi duse pothi garudar tappaddar Pb

References.—Gamble Man Timb 301 Stewart Pb Pl 168 Atkinson Him Dist 315

Habitat—A shrub or under shrub common on the Himálaya from Kashmir to Sikkim up to 9000 feet also on the Khásia Hills.

Dye—South of Kashmir it is said to be used as a dye (Stewart).

Structure of the Wood—Grey moderately hard splits and cracks and in seasoning separates into concentric masses. Annual rings distinctly marked by a belt of numerous and larger pores in the spring wood.

DYE

197

TIMBER

198

EMBELIA, Burm Gen Pl, II 644

199

Embelia Ribes, Burm Fl Br Ind III, 513 Wight Ic t 1207, [MYRSINÆÆ

Syn.—E GLANDULIFERA Wight

Vern.—Baberañ, wawrung HIND Biranga bhar-birung BENG Bási bidanga URIYA, Bebrang SYLHET Himalcheri NEPAL Vishaul MAL (S P) Babrung Pb B brang PUSHTU Basbrang wonding C P Bhiringeli MELGHAT Karkanne vaivarang BOMB Karkanne vadanga (fruit) MAR Vavading GUJ Bebrang SYLHET Váyu vilamgam vellal TAM Váyu vilamgam TEL Vayivalanga KAN Wel ambilla SING Vidanga SANS

The Conservator of Forests Panjáb in a recent report states that in Hazára the berries called Bebrang is the fruit of the Kokhur (*Myrsine africana*).

The fruit of **E. Ribes** is known as Babarang or Wai varang.

References.—Roxb Fl Ind Ed C B C 197 Voigt Hort Sub Cal 337 Brandis For Fl 284 Kurz For Fl Burm II 101 Thwaites En Ceylon Pl 172 Dals & Gibs Bomb. Pl 137 Elliot, Fl Andhr 190 U C Dutt Mat Med Hind 187 and 323 Dymock Mat Med W Ind 471 S Arjun Bomb Drugs 83 Murray Pl and Drugs Sind 168, Irvine Mat Med Patna 16 Med Top Oudh 32, Drury U Pl 194 Birdwood Bomb Pr 51, Balfour Cyclop., 1045 Treasury of Bot 448 Kew Off Guide to the Mus of Ec Bot 90 Mysore Cal Cal Bzh 21 Home Dept Cor 316

Habitat—A large climbing shrub, abundant in the hilly parts of India, from the Central Himálaya to Ceylon and Singapore, also in Burma.

E. 199

The Bayabirang a useful Anthelmintic. (J F Duthe)

EMBELIA
robusta.

MEDICINE
Seeds.
200

Medicine—According to *Susruta* the SEEDS of the plant have been described as anthelmintic alterative and tonic. Later writers (Dr U O Dutt informs us) recommend it as a carminative, stomachic and anthelmintic medicine. In the special report from Hazara (quoted above) it is stated that the berries are prescribed by Hakims in affections of the kidney; they are viewed as a perfect anthelmintic. Dose 6½ drachms of very finely powdered and previously shelled berries being given in a cup full of butter milk taken on an empty stomach the first thing in the morning. Many authors allude to them as entering into the composition of several applications for ringworm and other skin diseases. Royle says that they possess aperient properties. Dr Dymock that it is a common practice in the neighbourhood of Bombay to put a few berries of the *vaivarang* plant in the milk that is given to young children; they are supposed to prevent flatulence. He also states that the berries are largely collected in the Bombay Presidency and have lately been exported to Germany.

SPECIAL OPINIONS—§ 180 grains (a tola) of the powdered seeds administered at bed time in curdled milk followed by a dose of castor oil on the following morning has been found an efficacious remedy in tape worm (Assistant Surgeon Sakhiram Arjun Ravat L M Gorgaum Bombay). Used in Mysore externally by itself or in combination (Surgeon Major John North Bangalore). Half an ounce in powder mixed with *dahi* (curd) taken on empty stomach is a sovereign remedy for tape worm (Assistant Surgeon Mokund Lall Agra). The seeds are used as a carminative. For this purpose they are mixed with tobacco and smoked (Aligarh). An undoubted carminative and stomachic (Civil Surgeon S M Shurcore Moorsheadabad). Powdered seeds used in atonic dyspepsia (Surgeon Major J J L Ratton M D M C Salem). [This drug would seem to richly deserve being experimented with in Europe. It is an undoubted anthelmintic quite devoid of the nauseating property possessed by male fern. The writer has received numerous medical opinions from one end of India to the other in which a singular uniformity prevails. The drug is not referred to in the *Pharmacopœia of India*—Ed.]

Food—The SEEDS are said to be extensively employed as an adulterant for black pepper.

FOOD.
Seeds.
201
202

Embeliarobusta, Roxb Fl Br Ind III 515; Wight Ic t 1209

Syn—E BASAAL A DC

Vern.—Bayabirang HIND *Kalay bogoti* NEPAL *Kopadalli* GOND *B brang* OUDH *Bharangeli* KURKU *Amti ambat barbatti* BOMB *Aipmwaynway* BURM

References—Roxb Fl Ind Ed CBC 107 Voigt Hort Sub Cal 338 Brandis For Fl 284 Kurz Fr Fl Burm II 102 Beddome For Man 137 Gambl Man Lib 240, Thwaites Fn Ceylon Pl 173 Dals and Gibs Bomb Fl 136 Rheede Hort Mal V 23 t 12 Atkinson Him Dist 736 Treasury of Bot 448

Habitat—A shrub or small tree extending from the Sub-Himalayan tract east of the Jumna to Bengal, Ceylon and Burma.

Medicine—The FRUIT of this species like that of *E. Ribes* is given as an anthelmintic and internally for piles. Atkinson remarks that the greater portion of the *bayabirang* exported from Kumáon seems to be the fruit of *Myrsine africana*. In the *Treasury of Botany* it is mentioned that the young LEAVES in combination with ginger are used as a gargle in cases of sore throat; that the dried BARK of the root is a reputed remedy for toothache and that the BERRIES mixed with butter are used as an ointment which is applied to the forehead as a specific for pleuritis.

SPECIAL OPINION—§ Sometimes used as an antispasmodic and carminative (Surgeon-Major C J McGanna I M D Cawnpore)

MEDICINE.
Fruit.
203
Leaves.
204
Bark.
205
Berries.
200

**ENHYDRA
fluctuans****Engelhardtia Bark Tan****FOOD
Fruit.
207**

Food—In Orissa the **FRUIT** is eaten by the poorer classes Like that of *E. Ribes* it is collected and sold as an adulterant for black pepper On Parasnath Behar this is said to be a regular trade

Emblic myrobalan, see *Phyllanthus Emblica*, Linn

Emerald, see *Precious Stones and Rubies*

Endive, see *Cichorium Endivia* Linn Vol II, p 285.

208

ENGELHARDTIA, Leschen *Gen Pl III* 399 [*JUGLANDÆ*
Engelhardtia Colebrookiana, Lindl *Fl Br Ind V*, 596;

Vern—*Khusam* BUNDEL *Mowa gobar mowa bodal mowa mao Ku* MAON; *Timar rakh* PB

References—*Brandis For Fl* 499 *Kurz For Fl Burm II* 491
Gamble Man Timb 393 *Aitchison Cat Pb and Sind Pl* 140;
Atkinson Him Dist 317 *Royle Ill Him Bot* 342

Habitat—A small deciduous tree of the outer North West Himalaya ascending to 6500 feet often gregarious Sir D Brandis suggests the probability of this being shown to be only a tomentose and small sized variety of *E. spicata* in which opinion Sir Joseph Hooker (in *Fl Br Ind I c*) is inclined to agree

Structure of the Wood—Grey with a reddish tinge moderately hard even grained seasons and polishes well but is not durable (*Gamble*)

**TIMBER
209**

E. spicata, Bl *Fl Br Ind V* 595

Syn—*E. ROXBURGHIANA* Lindl *JUGLANS PTEROCOCCA* Roxb

Vern—*Silapoma* HIND *Bolas BENG Rungach ASSAM Dinglaba* KHASIA *Bor patta jam* CACHAR *Vakru GAKO Mowa mahua* NEPAL; *Suwak* LEPCHA

References—*Roxb Fl Ind Ed C B C* 670 *Voigt Hort Sub Cal* 296 *Brandis For Fl* 500 *Kurz For Fl Burm II*, 491, *Gamble Man Timb*, 393, *Ru nph Herb Amb II* 169 *Royle Ill Him Bot* 342 *Ind For I* 92

Habitat—A large handsome sub deciduous tree found in the Terai and outer hills of Eastern Himalaya up to 6000 feet also in Chittagong and Burma

Tan—Roxburgh states that its thick brown **BARK** possesses much tannin and is reckoned by the natives as the best material they are acquainted with for tanning purposes

**TAN
Bark
211**

Structure of the Wood—Similar to that of *E. Colebrookiana* showing a beautiful grain on a radial section It is used in Sikkim for tea boxes and building in the Khásia Hills and Cachar for planking, and spoons are made of it It does not warp

**TIMBER
212**

ENHYDRA, Lour *Gen Pl II* 360

213

Enhydra fluctuans, Lour *Fl Br Ind III* 304 **COMPOSITÆ**

Syn—*E. HELONCHA* DC *HINGTSHA REPENS* Roxb

Vern—*Harkhuch* HIND *Hingchá* BENG *Hilamochská* SANS

References—*Roxb, Fl Ind Ed C B C* 609 *Voigt Hort Sub Cal* 416 *U C Dutt Mat Med Hind* 185 300

Habitat—Found in East Bengal Assam and Sylhet frequenting rich damp soils

**MEDICINE
Leaves.
214**

Medicine—According to Dutt the **LEAVES** of this aquatic plant are regarded as laxative antibilious and useful in diseases of the skin and nervous system Prescribed as an adjunct to tonic metallic medicines given for neuralgia

**Juice
215**

SPECIAL OPINIONS.—§ Expressed **JUICE** of the leaves is used as demulcent in cases of gonorrhœa it is taken mixed with milk, either of cow or goat The leaves are pounded and made into a paste which is

E. 215

Thé Chota Chiretta, Gilla Nuta. (♂ F Duthie)	ENTADA scandens.
<p>applied cold over the head as a cooling agent' (Assistant Surgeon Anund Chunder Mookherjee Noakhally) 'Useful in torpidity of the liver The infusion should be made the previous evening It is boiled with rice and used with mustard oil and salt dose infusion 3i (Mr Forsyth F.R.C.S., Ed Civil Medical Officer Dinagapore North Bengal) Juice of fresh leaves is bitter and much used in dyspepsia and bilious complaints" (Shib Chundra Bhattacharjee Chanda Central Provinces)</p>	<p>FOOD Leaves. 210</p>
<p>Food — The LEAVES of this water plant are eaten by the natives as a vegetable Being somewhat bitter they are regarded as wholesome and invigorating (U C Dutt)</p>	
<p>ENICOSTEMA, Blume; Gen Pl II 807 [t 600 (Adenema); GENTIANACEÆ</p>	<p>217</p>
<p>Enicostema littorale, Blume Fl Br Ind IV 101 Wight Ic, Syn.—CICENDIA HYSSOPIFOLIA W & A; HIPPION ORIENTALE Dals & Gibs GENTIANA VERTICILLATA Linn Vern.—Chota kiriyata HIND Manucha SIND Kadavinayi MAR Mamiywa GUZ. Vallari TAM Nela-guli nela gulisidi TEL References —Roxb Fl Ind Ed CBC 264 Voigt Hort Sub Cal 520 Thwaites En Ceylon Pl 204 Dals & Gibs Bomb Fl 157; Atchison Cat Pb and Sind Pl 92; Bot Mag II 249; Elliot Fl Andhr 131 188 Pharm Ind 150 O'Shaughnessy Beng Dispens 460 Dymock, Mat Med W Ind. 2nd Ed 541, S Arjun, Bomb Drugs 193 Bidie, Cat Raw Pr Paris hxx 34 Drury U Pl 133; Lisboa U Pl Bomb 262 Balfour Cyclop I 727 Home Dept Cor regarding Pharm Ind 238 Ind Ann Med Sc Vol III 272</p>	
<p>Habitat —A small glabrous herb with whitish flowers in axillary clusters met with in moist places all over India from the Panjáb and Gangetic plain to Ceylon more frequent near the sea but unknown in Bengal</p>	<p>MEDICINE. 218</p>
<p>Medicine —This is the chota (small) chiretta of the natives It possesses marked bitterness and is much used in Madras as a stomachic It is also tonic and laxative (Pharm Ind) Dr Dymock states that it is brought to Bombay from Guzerat along with other simples the plant is collected when in flower and tied up in small bundles which contain a pound or more.</p>	
<p>Ensilage, see Fodder</p>	<p>219</p>
<p>ENTADA, Adans Gen Pl I 589</p>	
<p>Entada scandens, Bth, Fl Br Ind II 287 LEGUMINOSÆ</p>	<p>219</p>
<p>Syn.—E PURSETHA DC MIMOSA SCANDENS Linn Roxb Vern —Gilla gilagach BENG Geredi URIYA Pangra NEPAL Takto-khyem LEPCHA Gelha OUDH Chian N W P; Kastori haman PB Gardal ga dul garbi gharbi garambi piláppra (seeds) BOMB Kon gnyin nway hung nyen gonnyin gán nyin BURM; Pus wel SING References —Roxb Fl Ind Ed CBC 420; Brandis For Fl 167 Kurs For Fl Burm I 416; Gamble Man Timb 145; Thwaites En Ceylon Pl 98; Dals & Gibs Bomb Fl 83 Rheede Hort Mal VIII tt 32 34, IX t 77 Elliot Fl Andhr 60 181 Dymock Mat Med W Ind 2nd Ed 276 S Arjun Bomb Drugs 50 Med Top Aymsr 197 Baden Powell Pb Pr, 343 Drury U Pl, 195; Lisboa U Pl Bomb 154 Birdwood Bomb Pr 344 Royle Ill Him Bot 183 Spens Encyclop 795; Balfour Cyclop., I 1050 Smith Dic, 371 Treasury of Bot, I 452; Kew Off Guide to the Mus of Ec Bot., 53 Bomb Gas XIII 24 XV 433; Mason Burma and its People 503 771</p>	
<p>Habitat —A large climber of the forests of the Eastern Himalaya (ascending to 4 000 feet in Sikkim) Eastern Bengal South India, Manipur, Burma, and the Andaman Islands. Cosmopolitan in the tropics</p>	<p>E 219</p>

EPHEDRA

The Gilla Nut, made into snuff boxes &c

FIBRE

Bark

220

OIL

Seeds

221

MEDICINE

Seeds

222

Fibres

223

FOOD

Pods

224

DOMESTIC

225

Fibre — According to Dr Thwaites the tough BARK of this plant is used in Ceylon for cordage and ropes

Oil — An OIL is said to be expressed from the SEEDS the properties of which are not known

Medicine — A preparation from the SEEDS is used in pains of the loins and also in debility Dr Dymock remarks that the properties of the seeds do not appear to have been tested in European practice among the natives they have the reputation of being emetic Dr Mason says that in Burma they are in native Materia Medica used as a febrifuge Along with the seeds of several other leguminous plants they are often found mixed with Calabar beans in consignments exported from tropical Africa and all are known to the natives under the name of *garbes* beans An infusion of the spongy FIBRES of the stem is said to be used with advantage for various affections of the skin in the Philippines (*Dalz & Gibs Bomb Fl 84*)

SPECIAL OPINIONS — § * The kernels of the seeds are used by the natives as stomachic carminative and anodyne in cases of recent confinement The drug is said to excite appetite check fever relieve pain and regulate the functions of the chylopoietic viscera (*Civil Surgeon J H Thornton B A M B Monghyr*) Powdered kernel mixed with some few spices is commonly taken by native women for some days immediately after delivery for allaying the bodily pains and warding off cold (*Assistant Surgeon Anund Chunder Mookherji Noakhally*)

Food — The pods contain large flat hard polished chestnut-coloured seeds or rather nuts which on being steeped in water and afterwards roasted are sometimes eaten by the natives

Domestic Uses — Birdwood mentions that the pods which are often as much as 4 feet in length are used by the police in the West Indies According to Dr Thwaites the juice of the leaves is employed in Ceylon for stupefying fish The large ornamental seeds are frequently made into snuff boxes match boxes &c and Royle alludes to the fact that the Nepalese make use of a preparation from them as a hair wash The most general use however to which these seeds are applied is for crimping linen Dr Bonavia writing from Etáwa, contributed the following account of the process of employment to the Transactions of the Agri Horticultural Society Calcutta —

Dhobis up here and probably also down in Bengal use a curious kind of nut for crimping linen without using any crimping irons This nut they call in Oudh *Gelha* and here *Chian* the latter means a seed They say it is brought from Bengal and sold in Cawnpore The Dhobis cut one side and scoop out the kernel then they introduce two fingers into the cavity and quickly stroke the damp linen forwards with its polished surface This crimps it beautifully crossways

EPHEDRA, Linn Cen Pl III 418

(George Watt)

A genus of erect or sub-scandent rigid shrubs comprising some eight or ten species (or according to certain authors three times that number) met with in Europe temperate Asia and South America The EPHEDRÆ belong to the natural order GNETACEÆ—a family closely allied to the CONIFERÆ They have opposite or fascicled, terete striate jointed branches; also opposite scales at the joints and in the axils of these occur solitary or fascicled minute cones The flowers are uni-sexual and the plants often even diœcious On this account it is probable the males and females have been described as different species; and moreover they are extremely variable plants being much influenced by soil and humidity In India one species only can be said to occur throughout the Himaláya viz *E. vulgaris* Rich (= *E. Gerardiana*, Wall) but this is also distributed to Central and Western Asia and to Europe The other two Indian

The Soma and Homa.

(G Watt)

EPHEDRA.

species have a more easterly distribution—the one extending from Garhwal to Afghanistan and Persia (*E. pachyclada*, Boiss.) and the other being met with in the Panjab Rajputana Sind and distributed to Afghanistan and Syria (*E. peduncularis*, Boiss.)

Interest has recently been taken in these curious plants from the observation that the dried twigs of an *Ephedra* imported from Persia into Bombay constitute the sacred *Homa* of the Parsis. A sample of the *Homa* obtained in Bombay was at first determined as *Periploca aphylla*—an erect leafless perennial with twigs as thick as a goose-quill or less and possessing a milky sap. Subsequent examination of other samples however revealed the fact that the *Homa* of the Parsis was in reality an *Ephedra* and this determination has since received support from the information recorded by Dr Aitchison in his botanical report in connection with the Afghan Delimitation Commission where it is stated *Ephedra pachyclada*, Boiss. bears in the Hari-rud valley the names of *Hum-huma yehma*. Dr Aitchison states of that plant that it was found a very common shrub from Northern Baluchistan along our whole route in the Hari-rud Valley, the Badghis District and Persia growing in stony gravelly soil. Of *Ephedra foliata*, Boiss. Dr Aitchison further affirms that it is known as *Hum-i bandak*.

The question has thus been suggested is the *Homa* of the Parsis the *Soma* of the early Sanskrit writers? Professor Max Müller in an article in the *Academy* (1884) writes. It is well known that both in the Veda and the Avesta a plant is mentioned called *Soma* (Zend *Haoma*). This plant the learned Professor continues when properly squeezed yielded a juice which was allowed to ferment and when mixed with milk and honey produced an exhilarating and intoxicating beverage. This *Soma* juice has the same importance in Veda and Avesta sacrifices as the juice of the grape had in the worship of Bacchus. The question has often been discussed what kind of plant this *Soma* could have been? When *Soma* sacrifices are performed at present it is confessed that the real *Soma* can no longer be procured and that some *Ci prés* such as *Putikas* &c must be used instead. Dr Haug who was present at one of these sacrifices and was allowed to taste the juice had to confess that it was extremely nasty and not at all exhilarating. Even in the earliest liturgical works in the Sûtras and Brahmanas the same admission is made namely that the true *Soma* is very difficult to be procured and that substitutes may be used instead. When it was procured, it is said that it was brought by barbarians from the North and that it had to be bought under very peculiar circumstances. Professor Max Müller in a further passage furnishes the oldest known description of the *Soma* plant. He writes. I published so far back as 1855 in the *Journal of the German Oriental Society* an account of the plant. After describing the peculiar rules for buying and rebuying the *Soma* from northern barbarians as given in the *Apastamba Yagna paribhasâ* I added a note. The only botanical description of the *Soma* plant which I know at present is found in an extract from the so-called *Ayur-veda* quoted in the *Dhûrtasvami bhaskiyatika*. There we read. The creeper called *Soma* is dark sour without leaves milky fleshy on the surface it destroys phlegm produces vomiting and is eaten by goats. I added that according to the opinion of Sir J. D. Hooker this description points to a *Sarcostemma*, which alone of a large family combines the qualities of sour and milky but I remarked at the same time that the fact of this *Sarcostemma* growing in the Presidency of Bombay militated against this identification because the true *Soma* must be a northern plant, which was replaced in India itself by *Pâtikâs* or similar substitutes.

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I cannot vouch for the exact age of the *Ayur-veda* but I doubt whether we shall find any scientific description of the *Soma* of an earlier date."

Since however it is stated in the *Sûtras* and *Brâhmanas* that substitutes at even that early period had to be used, may it not be that the description in the *Ayur veda* is the description of the best known substitute? *Sarcostemma* would be difficult to procure in most parts of this country it would in fact have to be imported from the Deccan to Upper and Northern India. The description however would agree admirably with that of a *Sarcostemma*. Assuming the determination correct the substitutes for it—the *Putikda*—one of which was the *Pui sak* (*Basella*) would when deprived of their leaves closely resemble the twigs of *Sarcostemma*. Added to all this we have the fact that Roxburgh calls *Sarcostemma brevistigma* the *Soma lutu* (or *Soma climber*) and says of it that it has so much milky juice of a mild nature that native travellers often suck the tender shoots to allay their thirst. Mr Duthie gives the name *Soma* to the grass *Setaria glauca*, and a very large number of other plants in the various dialects of India have names like *Soma* or *Homa*. For example *Veronica anthelmintica* is in Hindustani known as *Soma raj* so also is *Pæderia foetida*. A creeper with fleshy stems and milky sap however must of necessity almost be a member of the *ASCLEPIADEÆ* or of the *EUPHORBIACEÆ*. Some of the species of *Ephedra* are sub-scandent leafless shrubs but they have not got a milky sap and far from being likely to cause vomiting when taken they are pleasant in flavour and not unlike the hops of Europe. But the twigs of *Sarcostemma* are certainly not dark but rather of a delicate succulent green colour. They might turn black when removed from the plant in the form ready for export but would only do so when the whole of the milky sap had been dried up. The word 'dark' would however be perfectly applicable to the brownish twigs of the leafless shrub *Periploca aphylla*. That plant has a milky sap and Dr Aitchison informs us that in Northern Baluchistan it is known as *Um* or *Uma*. Of *Periploca hydaspidis* Falc (which Aitchison collected at Jelamai near Shinak) he wrote— it is quite impossible to distinguish it as it grows from *Ephedra ciliata* Fisch & Mey. A wild species of grape vine is in Kashmir known as *Um* or *Umbur* and in most of the languages of India the imported grapes brought into this country are known as *Angur* a Persian name. Its Sanskrit name is *Draksha*. A grape grown in Europe and Australia is known as the Kashmir

Thus it would appear that the evidence derived from modern vernacular names largely breaks down. Dr Dymock at the writer's suggestion examined the *Homa* plant used in Bombay by the Parsis and pronounced it to be *Periploca aphylla*. A sample was afterwards sent to Kew and Mr W T Thiselton Dyer wrote that the *Homa* of the Parsis is undoubtedly *Ephedra vulgaris*. Acting on this assurance the writer through the kindness of Dr Dymock had a sample of *Ephedra vulgaris* chemically analysed with the result that the opinion he formerly advanced seemed to be confirmed viz that it afforded a bitter principle which might have been employed much after the same manner as hops are used in Europe and *Acacia* bark in India e.g. as a bitter adjunct in the preparation of an alcoholic beverage similar to beer or to the Angami Naga *Zû* from rice. It would now however appear from a renewed study of the facts since brought to light that *Periploca* may have an even stronger claim to consideration than *Ephedra*. It seems probable that both plants are used by the Parsis and assuming that the names *Homa* and *Soma* referred to one and the same thing originally, it may be worth while suggesting that a chemical analysis of *Periploca* should be made in order to determine if it affords, like *Ephedra*, a harmless bitter principle. It is a

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(G Watt)

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native of Northern and Western India in the drier tracts, and is from thence distributed through Baluchistan and Afghanistan to Persia, Arabia, and Nubia. It is in fact of all the *Asclepiadæ* the most prevalent Central Asian species and is a climbing shrub which answers admirably to the description given by Professor Max Müller except in the absence of any information as to its being used as an ingredient still less as the principal constituent of an intoxicating beverage. It is however eaten by goats. "The flower buds are sweet and are eaten raw or cooked as a vegetable. The majority of the plants belonging to this family act as emetics and it is probable that the mature twigs would be found to possess that property though they are not so mentioned by Indian writers. There is no evidence of a *Sarcostemma* being found in Central Asia while *Periploca* is abundant. But it is by no means rare in the hotter parts of Upper India also so that we are confronted with a serious difficulty. If *Periploca* was the *Soma* of the Aryan invaders of Southern Asia they failed to recognise the plant in India and it was perhaps only after they had penetrated to the extreme southern and western limits of their new empire (where *Periploca* does not occur) that they first discovered a plant which seemed to deserve the ancient and sacred name *Soma* the *Sarcostemma* of botanists.

There is however another feature of the *Soma* of the *Ayur-veda* that has still to be dealt with *vis* it was imported into India from the North by barbarians and when properly squeezed yielded a juice which was allowed to ferment and when mixed with milk and honey produced an exhilarating and intoxicating beverage. These are Professor Max Müller's words and it is assumed they express the main ideas conveyed in Sanskrit literature. Now it may safely be affirmed that we know of no milky plant the severed twigs of which would be found to still possess their sap on arrival in the plains of India from a Northern trans-Himalayan region. The expression as to their yielding juice when properly squeezed must therefore have some other interpretation assigned to it. But the juice we are told was allowed to ferment and in that state was mixed with milk and honey. May it not therefore have been the case that a decoction was made of the dried twigs which was employed as a ferment with the milk and honey? It is enjoined that the juice was to be obtained from the stem of a plant not the fruit* and that the liquor was not to be prepared by distillation but all this could have been arrived at by flavouring with the *Soma* decoction (or infusion) a saccharine liquid left until fermentation had set in. The twigs would be softened in the process of preparing the decoction and the direction to squeeze them might fairly well have reference to this stage of the process. The Angami Nagas pour boiling hot water over rice and leave the infusion for three or four days by which time the fluid is both refreshing and exhilarating but soon becomes absolutely intoxicating. They are not reported to add any adjunct to their *Zu* in order to assist fermentation but doubtless this is unnecessary since the troughs in which it is prepared are not washed out between each fresh brew. In the various parts of India different materials are employed to establish fermentation. This has already been dealt with in Volume II page 259 of this work. The reader will there find mention of a cyperaceous plant (vulgarly a grass) and among many others a *Terminalia* which might answer to the *Arjuna* specified in certain passages in Sanskrit works as one of the *Soma* substitutes. The Santals use a plant known to them as *Saram lutur* (*Clerodendron serratum*) when they wish

* An expression which might be accounted for by the remarkable similarity of the long round fruits of *Periploca* to portions of the stem

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to make their liquor specially intoxicating; and it is said that even from the milky juice of *Calotropis gigantea* (the *Ak akanda* in Bengal the *Ushar* in Arabic *Khark* in Persian and the *Arka alarka* of Sanskrit) an alcoholic beverage may be prepared. Since most writers hold that the long grapes of Afghanistan which might not inaptly be compared to the joints of the human fingers cannot be admissible, the final conclusion which the writer has come to regarding the so called *Soma* plant of the ancient Vedic literature is that it would be safer to view the references to that plant as indicating *an early discovery of the art of fermentation** than to seek to establish any special and peculiar plant which may have been first so used. The disappearance of all knowledge in any such special plant (the first fermenting agent) might on this hypothesis be attributed to the discovery of better and easier processes both in the original home of the *Soma* and in the country of Arvan adoption until the practice lost its sacred associations in the prevalent use of the substitutes. The sacerdotal injunctions might have survived for a time and substitutes which resembled but possessed none of the properties of the original *Soma* might easily be supposed to have been used by the priesthood while the art of fermentation became a domestic industry.

Some short time ago the writer published a few notes on the subject of the *Soma* plant suggested on reading Professor R. von Roth's paper in the German Oriental Society's Journal for 1884. He instituted a correspondence on *Soma* with certain eminent scholars and a few of their replies may appropriately be here reproduced. These will be found to support the main contention advanced above that the *Soma* was an adjunct in the preparation of the beverage of the ancient Aryans but did not itself afford a sweet exhilarating fluid.

Dr Dymock wrote: On looking over the *Zend Avesta* &c &c it appears to me that the *Homa* or *Soma* was not used to obtain liquor from its juice but that only a small portion of it was added to liquor obtained from grain. The Parsi priests say that the *Homa* never decays and they always keep it for a considerable time before they use it. It may therefore be remarked—if the *Homa* and *Soma* are the same thing this fact is utterly at variance with Dr Roth's interpretation of the Sanskrit passages regarding the *Soma* not keeping.

Dr Rice of New York a distinguished Sanskrit scholar said —

For your interesting pamphlet on the *Soma* plant I am much obliged. Of course I had read the papers by Professor Roth already in the original German but the additional remarks now accompanying them are also interesting. I have often tried to reconcile the apparent objections against the *Soma* to be plain and simple sugarcane but have not been able to overcome the apparently well authenticated statements as to the altitude over the sea level and other data which positively prohibit such a belief. But the description of the plant its pleasant juice &c &c aside from other considerations make one think of sugarcane or some species of *Sorghum*.

This is certainly a most interesting suggestion but apart from other difficulties it seems impossible to suppose that branches of sugarcane could have been carried from Central Asia to India so as to still contain their sweet sap. As a matter of fact the sugarcane sap in India dries up completely in less than a month. Sugarcane (*Saccharum officinarum*) is very likely a native of South Eastern Asia—from Bengal to Cochin China. It was probably first systematically cultivated in India. It is therefore highly improbable that any form of sugarcane was cultivated in Central Asia during the Vedic period or was perhaps even known to the Sanskrit speaking people prior to their invasion of India. Most of the

In Siberia the ermine-hunters when their yeast fails use the inner bark of the pine as a ferment

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(G Watt)

EPHEDRA
peduncularis.**HISTORY**

Indian and European names for sugar appear to be derived from the Sanskrit *Sarkara* but it does not follow that *Sarkara* was in its original application the sweet preparation from a species of sugarcane. An ancient name for Bengal is *Gura* from whence is derived *Gula* raw sugar a term which extends from India throughout the Malayan Archipelago. But *Gura* (or *guda*) occurs also in many ancient writers such as *Oharaka* and *Susruta* so that sugar manufacturing was known in Upper India as well as Bengal. May it not have been prepared from some of the palms such as the date-palm which to the present day is in Bengal so extensively grown as a source of *gur* or raw sugar? The Sanskrit name of the sugarcane plant *Ikshu* as *DeCandolle* points out has survived in Bengal as *Ak* and in Hindustan as *Uk*. But though perhaps but a coincidence it is worth while adding that a similar word exists in some of the Southern and Eastern languages of India for the date palm. Thus it is *Icham* or *Ishan* in Tamil and the sugar prepared from the juice *Ich cha vellam*. In Telegu the date palm is *Ita* and in Malayal *Inte*. The English word candy and the Arabic *kand* come from the Sanskrit *khandā* crystallized sugar and these names recall *Calotropis gigantea*—the *ak ākanda* which according to the Arabs and Persians yields sugar and manna.

In a letter addressed to the Government of India on the subject of the *Soma* by Raja Rajendra Lala Mitra LL D OIE we are promised to be favoured with a complete series of the passages relating to the *Soma* from Sanskrit authors. Dr Mitra wrote—

In the later Vedas the juice of the plant appears to have been used like hops in Europe as an ingredient in the preparation of a kind of beer and not as a beverage by itself. In poetry of course they talk of drinking the *Soma* juice but this in the Brāhmaṇa period of the Vedas is looked upon as a figure of speech. The rituals nowhere enjoin the use of the juice by itself as a meat offering. If we may rely on this interpretation of the Brāhmaṇas and the rituals as the right one it would be in vain to search for a plant with profuse sweet juice as the *Soma*. The word Sweet which has so much puzzled the learned Professor von Roth may be safely nay appropriately used in a poem in praise of bitter beer. (G Watt *Editor Dictionary Economic Products of India*)

Ephedra pachyclada, Boiss *Fl Br Ind V 641* GNETACEÆ

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Vern.—*Hum kuma gehma* ARGH *Oman* PUSHTU

References.—*At his on Bot Afghan Del Conn in Trans Linn Soc*

Habitat.—Rather a tall shrub found in the drier regions of the Western Himālaya and Western Tibet

Tan.—Aitchison says—The BRANCHES are employed in tanning the skins of goats for water bottles. Dr Banerji writing from Duki in Baluchistan mentions that this plant is used for tanning leather in that part of the country also

Food.—The small red FRUIT is eaten according to Aitchison

Domestic Use.—The ashes Aitchison says are used either mixed with or in lieu of snuff. Griffith also makes mention of an *Ephedra* near the Khyber as being used for the same purpose

E peduncularis, Boiss *Fl Br Ind V 641*; Brandis *For Fl t 69*

Syn.—E ALTE Brand

Vern.—*Kuchan nikki kurkan b attā tandala lastūk mangarmal* Ps
Bandukās TRANS-IND *Alte* ARAB

References.—Brandis *For Fl 501*; Aitchison *Cat Pb and Sind Pl 142* *Raj Gan 30* *Edgew Journ Linn Soc VI 194*

Habitat.—A tall scandent shrub often glaucous with slender branches common on stony ground in Sind the Panjāb and Rājputāna

TAN
Branches
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FOOD,
Fruit,
230
DOMESTIC
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E 232

ERAGROSTIS
abyssinica.**Fodder Grasses****DOMESTIC****233****Domestic Use** — Bunches of the stem and branches sometimes used on the Salt Range for cleaning brass dishes**234****Ephedra vulgaris**, Rich ; Fl Br Ind, V, 640**Syn.**—E GERARDIANA Wall E DISTACHYA and MONOSTACHYA, Linn**Vern**—Amsánia butshur budshur chewa PB Khanda khama KUNA
WAR Tse tsapali trans LADAK Phok SUTLEJ VALLEY**References**—Brandis For Fl 501 Gamble Man Timb 394 Stewart
Pb Pl 228 Boiss Fl Or V 713 Atkinson Him Dist 318 Econ
Prod N W Prov, Part V 89 Royle Ill Him Bot 348 Ind For
January 1885 Vol XI 5 Jour Agri Hort Soc Ind Vol IV Selec
tions p 263**Habitat.**—A small low growing rigid shrub abundant in the drier regions of the temperate and alpine Himálaya from Western Tibet to Sikkim ascending to 16 000 feet It is abundant on the Shalai hill north of Simla at an altitude close on 10 000 feet**TAN****235****Tan**—Specimens of the twigs &c collected near Simla were analysed by Dr Dymock The yield was only 3 per cent of tannin giving a whitish precipitate with gelatine and with acetate of lead and a greenish precipitate with acetate of iron**MEDICINE****236****Medicine**—Aitchison remarks that some part of the plant is used medicinally in Lahoul (Proc Linn Soc X, 77)**FOOD****237****Food**—Dr Stewart says that the red berries have a not unpleasant mawkish sweet taste and are sometimes eaten by the natives of the Panjáb Himálaya They are also eaten in Kumaon**FODDER****238****Fodder**—The plant is browsed by goats**TIMBER****239****Structure of the Wood**—Whitish yellow Occasionally used as fuel**240****Epicanta nepalensis**, Moore COLEOPTERA

An insect recommended as a substitute for Cantharides see Vol II 128

Epicarpurus orientalis, Bl, see Streblus asper**Epsom salts**, or Epsomite, see Magnesia**EQUISETUM, Linn**

(F F Duthie)

241**Equisetum debile**, Roxb EQUISETACEÆ**Vern**—Buru kathom charac SANTAL Matti shinung bandukhi nari
trotak buki PB Myet sek BURM**References**—Roxb Fl Ind Ed CBC 745 Voigt Hort Sub Cal
560 Stewart Pb Pl 267 Aitchison Cat Pb and Sind Pl 178**Habitat**—A perennial vascular cryptogam with creeping rhizomes and weak fluted stems composed of superposed jointed tubes Found in wet situations in the Panjáb North Western Provinces Bengal and Burma.**MEDICINE****Plant****242****Medicine**—The PLANT is administered as a cooling medicine and near Jhelum is given for gonorrhœa (Stewart)**FODDER.****243****Fodder**—According to Dr Stewart it is at times given to cattle as fodder**DOMESTIC****244****Domestic Use.**—Joints of the stem are used by the natives for cleaning the surface of the nails**Equus**, see Horses, Mules, and Asses'**ERAGROSTIS, Beauv Gen Pl, III, 1186****245****Eragrostis abyssinica**, Link Duthie, Fodder Grasses N Ind 66

An Abyssinian species largely grown in the mountainous districts of that country for its grain of which the natives make bread It is called

E. 245

Fodder Grasses	(F F Duthie)	ERAGROSTIS cynosuroides
<p>Teff, Thaf or Thief and there are two distinct varieties, white and red the former is sown as a cold season, and the latter as a rainy season crop Experiments recently undertaken at Saharanpur with seed received from the Royal Gardens Kew indicate the possible utility of the plant in this country for fodder purposes For further particulars see <i>Kew Bulletin of Miscellaneous Information</i> No 1 (1887)</p>		
Eragrostis bifaria, W & A, Duthie, Fodder Grasses, N India, 61		246
Syn.— <i>POA BIFARIA</i> Vahl		
Vern.— <i>Punya safed chota bhankta</i> (Ajmere) <i>moi</i> (Mt. Abu) RAJ <i>Wooda tallum</i> TEL		
References.—Roxb <i>Fl Ind Ed C B C</i> 111 <i>Thwaites En Ceylon Pl</i> 373		
Habitat.—A perennial grass with wiry stems about one foot high Common on dry rocky ground in hilly parts of India In Ceylon up to 5000 feet		
Fodder.—At Ajmere it is considered a good fodder grass it is eaten by cattle on Mount Abu		FODDER. 247
E Brownei, Nees Duthie Fodder Grasses, N Ind 62		248
Syn.— <i>POA B OWNEI</i> Kunth		
Vern.— <i>Jenkua</i> ROHILKHAND <i>Khari</i> BUNDELKHAND; <i>Asata chir</i> (Seoni) C P <i>Choti khudi</i> BERAR		
References.— <i>Thwaites En Ceylon Pl</i> 373 <i>Aitchison Cat Pb and Sind Pl</i> 169		
Habitat.—A perennial grass with stems about one foot high and bearing numerous closely packed dark coloured spikelets It is plentiful in wet places all over India ascending to moderate elevations on the Himalaya		
Fodder.—No definite information has been obtained regarding the feeding value of this grass in India though no doubt it is eaten by cattle along with other grasses In Australia according to Baron von Mueller it is looked upon as a good pasture grass yielding an abundance of food both winter and summer		FODDER. 249
E ciliaris, Link Duthie, Fodder Grasses, N Ind 62		250
Syn.— <i>POA CILIARIS</i> Linn P <i>CILIATA</i> Roxb		
Vern.— <i>Undar punchha</i> JEYPUR <i>Tor chandbol</i> SANTAL		
References.—Roxb <i>Fl Ind Ed C B C</i> 112 <i>Dals & Gibs Bomb Fl</i> 298 <i>Aitchison, Cat Pb and Sind Pl</i> 169		
Habitat.—Annual with hairy florets in narrow spike-like panicles Common on sandy ground A small variety with the spikelets in short roundish heads is frequently met with		
Fodder.—Affords good grazing wherever it occurs in sufficient quantity		FODDER. 251
E cynosuroides, R & S Duthie Fodder Grasses N Ind 62		252
Syn.— <i>POA CYNOSUROIDES</i> Retz <i>BRIZA BIPINNATA</i> Linn		
Vern.— <i>Dab dab durva daval</i> HIND <i>Kusha</i> BENG <i>Dabbi</i> BUNDEL; <i>Dab dhab dabbi kush</i> N W P <i>Dib dab, dhab drab drabh kusa</i> PB <i>Kir thag drab</i> AVG; <i>Chir dabhat kusha</i> C P; <i>Darbha</i> BOMB; <i>Darbha</i> MAR; <i>Darbha kusa darbha dabha durpa, aswalayana</i> TEL; <i>Kusha kutha darbha puvitrung</i> SANS.		
References.—Roxb <i>Fl Ind. Ed C B C</i> 112; <i>Voigt Hort Sub Cal</i> 716 <i>Dals & Gibs Bomb Fl</i> 298 <i>Stewart Pb Pl</i> 354; <i>Aitchison Cat Pb and Sind Pl</i> 169 <i>Elliot Fl Andhr</i> 17 46 105 <i>Dymock Mat Med W Ind 2nd Ed</i> 854 B <i>Arjun, Bomb Drugs</i> 153; <i>Year Book Pharm</i> 1878, p 288 <i>Baden Powell Pb Pr</i> 383 <i>Atkinson Him Dist</i> 736 807; <i>Lisboa U Pl Bomb</i> 279 284 290 <i>Birdwood Bomb Pr</i> 347 <i>Royle Ill Him Bot</i> 427; <i>Balfour Cyclop Ill</i> 237; <i>Taylor Topography of Dacca</i> 60		

**ERAGROSTIS
megastachya****Fodder Grasses**

Habitat—A strong coarse perennial grass with thick far creeping rhizomes common in barren ground and sandy soil on the plains of the North Western Provinces the Panjáb and Sind; it grows luxuriantly also on the low lying portions of the *usár* lands in the North Western Provinces

FIBRE
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Fibre—It produces a fairly strong fibre which is used for making ropes In the Karnál Settlement Report it is stated that the fibre is used for the ropes of Persian wheels and they are said to last for three months or more **Stewart** remarks that the upper part of the stem is in some places used for making the sieves employed in paper manufacture

MEDICINE
Culms
254

Medicine—The stout **CULMS** are said to possess diuretic and stimulant properties with a bitter taste **Dr Dymock** writes It is the *Gramina* of the Portuguese at Goa The *Gramen* of the Romans and *αγρωστος* of the Greeks was *Triticum repens* still much used as a diuretic in Europe The same author states that in the Concan it is prescribed in compound decoctions with more active drugs for the cure of dysentery menorrhagia &c

FODDER
255

Fodder—Cattle do not eat it as a rule though it is liked by buffalos **Captain Wingate** however says that it is the principal fodder grass on both sides of the Indus in the Derajât tract According to **Dr Aitchison** it is considered by the Afghans to be a good fodder grass and was largely used as such for the animals belonging to the Delimitation Commission along portions of their route

**SACRED AND
DOMESTIC**
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Sacred and Domestic Uses—**Dr Dymock** says that it is in constant requisition at the funeral ceremonies of the Hindus and that the chief mourner wears a ring of the grass upon his finger it is also placed beneath the *pindas* **Dr Lisboa** in the Botanical Volume of *Bombay Gazetteer* states that it is mentioned in Chapter XX of *Chaturmas Mahatma* that this plant is a transformation of *Ketu* and that Chapter XXVI of *Shravan Puran* orders that these *darbh*s should be pulled out of the ground on *Pithori Amvashya* and that unless this is done the plants are not considered fit for use in sacred ceremonies

The following account is given by **Balfour**—

Some Hindu legends make *Garuda* the offspring of *Kasyapa* and *Diti* This dame laid an egg which it was predicted would produce her a deliverer from some great affliction After a lapse of five hundred years *Garuda* sprang from the egg flew to the abode of *Indra* extinguished the fire that surrounded it conquered its guards the *devata* and bore off the *amrita* (ambrosia) which enabled him to liberate his captive mother A few drops of this immortal beverage falling on the *Kusa* it became eternally consecrated and the serpents greedily licking it up so lacerated their tongues with the sharp grass that they have ever since remained forked but the boon of eternity was ensured to them by their thus partaking of the imperishable fluid This cause of snakes having forked tongues is still in the popular tales of India attributed to the above greediness At the Ganges bathing places for pilgrims the Brahman guides usually present the pilgrim with blades of this grass

This grass is frequently used for thatching and sometimes for the doors and walls of huts (*Conf with Cynodon Dactylon*, Vol II p 679.)

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Eragrostis megastachya, *Link ; Duthie, Fodder Grasses N Ind 63*

Syn—**E MAJOR Host**

Vern—*Chirya ke-chaulas* N W P

References.—*Thwaites En Ceylon Pl 373 Aitchison Cat Pb and Sind Pl 160.*

Habitat.—This and *E poseoides*, *Beauv*, regarded by some writers as

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Fodder Grasses.

(F F Duthie)

**ERAGROSTIS
tenella.**

varieties of one species, are commonly met with in most parts of India, ascending to 7 000 feet on the Himálaya. Both are annual grasses with spreading many flowered panicles

Fodder—Used more or less as fodder for cattle and horses

Eragrostis nutans, Nees Duthie Fodder Grasses N Ind, 63

Syn.—*POA NUTANS, Retz* P INTERRUPTA Roxb

Vern.—*Lál báli asaunra mumkara* BUNDEL; *Lamcha rasaurah ghui* N W P *Kutti pushli sur lumra* PB; *Gnodila ghorila khajuria* C P *Nakurmaral naka naru urenka uranke* TEL

References.—Roxb *Fl Ind Ed C B C* 112 Voigt *Hort Sub Cal* 715 Thwaites *En Ceylon Pl* 373 Dals & Gibs *Bomb Fl* 398 Aitchison *Cat Pb and Sind Pl* 169 Elliot *Fl Andhr* 123 187

Habitat.—A tall annual grass having long narrow spikes which often assume a pinkish red tinge when mature It is usually met with in heavy retentive soils and along the banks of water-courses and borders of rice-fields

Fodder—Though not a first-class fodder grass cattle eat it readily when other better kinds have failed

E pilosa, Beauv Duthie Fodder Grasses N Ind 64

Syn.—*E VERTICILLATA R & S*; *POA PILOSA* Linn

Vern.—*Nika sanmak gadar punch* PB *Palichhi* RAJ; *Kutaki* C P

References.—Thwaites *En Ceylon Pl* 373 Aitchison *Cat Pb and Sind Pl* 170

Habitat.—An annual species with slender stems and numerous minute spikelets borne on spreading panicles common in India and usually found in damp localities

Fodder—Buffalos are said to be fond of this grass Mr Symonds remarks that cattle eat it readily and that it would make good hay According to Mr Lowrie it is considered to be a good fodder grass at Ajmere

E plumosa, Link Duthie Fodder Grasses N Ind 64

Syn.—*POA PLUMOSA Retz*

Vern.—*Phularwa* BUNDEL *Bara bhurbhura bholoni galgala jhusa* N W P *Budhan palinyi* PB *Chiri ka khet chir ko-bajro* RAJ; *Sipar bharbusi pithi safed bhurki chikhi chippal* C P

References.—Roxb *Fl Ind Ed C B C* 113; Voigt *Hort Sub Cal* 715 Thwaites *En Ceylon Pl* 373 Aitchison *Cat Pb and Sind Pl* 170 Rhede *Hort Mal XII* 75 t 41 Rumph *Amb VI* 10 t 4 f 3 Atkinson *Him Dist* 320

Habitat.—A slender annual species very common especially on sandy soils Variable both as to size and habit *E viscosa* Trin is probably only a variety with sticky inflorescence Another variety (*var densiflora*, Hack) with congested spike like panicles and resembling forms of *E cilans* is common on usar soils

Fodder—Mixed with *dub* it has been found to produce excellent hay at Allahabad In Rajputana it is valued as a fodder grass

E tenella, Beauv Duthie Fodder Grasses N Ind 65

Syn.—*POA TENELLA Linn*

Vern.—*Ich koric* SANTAL *Bharbur* N W P *Mondiafori* C P

References.—Roxb *Fl Ind Ed C B C* 113; Voigt *Hort Sub Cal* 716

Habitat.—An annual with stiff rather brittle flowering stems bearing minute spikelets, which are often tinged with red when mature Common on cultivated ground and frequently associated with rainy season crops

Fodder—Eaten by cattle both green and as hay, and the grain is said to be nutritious

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FODDER

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FODDER.

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**ERIGERON
asteroides**

Construction of Oil vessels

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Eragrostis rachitricha, *Hochst Duthie, Fodder Grasses, N Ind* 65 89Syn — *POA MULTIFLORA* Roxb E TREMULA *Hochst*Vern — *Kalunjī bhamirī bansa N W P Chankan buti, lakh, Pb ;*
*Chiri ka khet chiri ka chunwalia RAJ*References — *Roxb Fl Ind Ed C B C 114 Voigt Hort Sub Cal,*
*716 Dals & Gibs Bomb Fl 298 Aitchison Cat Pb & Sind Pl 169***Habitat** — An annual with stems 1—1½ feet The extremely slender pedicels which support the long many flowered spikelets give rise to the constant tremulous motion exhibited by this species when in flower It is a characteristic grass of sandy soils in North India**Food** — The grain is said to have saved many lives during the severe famine of 1813, and which is now alluded to as the *lakṣadūā sāl***Fodder** — Regarded as a good fodder grass at Ajmere

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FODDER

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EREMOSTACHYS, *Bunge Gen Pl II 1215*

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Eremostachys Vicaryi, *Benth Fl Br Ind IV 695 LABIATÆ*Vern — *Gurgunna khaldirā rewand chini Pb*References — *Stewart Pb Pl 168 Aitchison Cat Pb & Sind Pl 119***Habitat** — A beautiful yellow flowered plant common on the Salt Range ascending to 2 500 feet also met with at Peshāwar**Medicine** — The SEEDS are given as a cooling medicine**Domestic Use** — The plant is said to be used in the Eusufzai near Peshāwar for poisoning fish

MEDICINE

Seeds

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EREMURUS, *Bieb Gen Pl III 787 [280 LILIACEÆ*

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Eremurus spectabilis, *M Bieb Baker in Linn Soc Journ XV*Vern — *Shils bre prau B*References — *Stewart Pb Pl 234 Balfour Cyclop I 1052***Habitat** — A handsome herbaceous plant with close spikes of white flowers and linear radial leaves found on the Panjāb Himālaya between 6 000 and 9 000 feet**Food** — The leaves when young are much eaten both fresh and dry cooked as vegetables (*Dr Stewart*)

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Domestic Use — *Dr Aitchison* in his Report on the Botany of the Afghān Delimitation Commission draws attention to an interesting economic product derived from *Eremurus Aucherianus Boiss var Korolkowi*. Its long fleshy roots are dried and ground into powder which forms into a jelly with boiling water This jelly is then hardened into variously shaped vessels called *dabba* used for holding oil and clarified butter There is a large trade in this material in Khorāsān and *Dr Aitchison* believes that the introduction of these vessels into India would be much appreciated by the Hindu community as a substitute for the animal skins at present employed in the oil and *ghī* trade It is not known if any of the Indian species could be similarly used**Ergot or Ergota**, see *Claviceps purpurea*, Vol II, 359.**Eria**, see *Silk***ERIGERON**, *Linn Gen Pl, II, 279*

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Erigeron asteroides, *Roxb Fl Br Ind III, 254 COMPOSITÆ*Vern — *Maredī, sonsali BOMB*References — *Roxb Fl Ind Ed C B O 603 Dymock Mat Med W*
*Ind 429***Habitat** — A coarse hairy annual 1 2 feet high found in Bengal and the Western Peninsula, and up to 4,000 feet on the Eastern Himālaya**E 276**

The Loquat Fruit.	(F F Duthie)	ERIOCHLOA annulata.
Medicine. —Dr Dymock states that this HERB together with other simples, is brought for sale into the Bombay bazar from Guzerat as a stimulating and diuretic medicine.		MEDICINE. 277
ERINOCARPUS , <i>Nimmo Gen Pl, I, 234</i>		
Erinocarpus Nimmoanus , <i>Grah Fl Br Ind I 394</i> ; TILIACEÆ Vern. — <i>Chera chira</i> , BOMB <i>Chowra</i> , <i>jangli bhendi haladi adawi</i> KAN		278
References. — <i>Baddome Fl Sylv t 110 Gamble Man Timb 52 Grah, Cat Bomb Pl, 21 Dals & Gibs Bomb Fl., 27 Lisboa U Pl Bomb 28 Balfour Cyclop I 1052</i>		
Habitat. —A tree, with large yellow flowers found in the Deccan and parts of the Bombay Presidency		
Fibre —The BARK is said to yield an excellent fibre for ropes		FIBRE. Bark
Structure of the Wood —Soft used for yokes and rafters.		270
ERIOBOTRYA , <i>Lindl Gen Pl I, 627</i> (under <i>Photinia</i>)		TIMBER.
Eriobotrya bengalensis , <i>Hook f Fl Br Ind, II, 371</i> , ROSACEÆ		280
Syn — <i>MESPILUS BENGALENSIS Roxb</i>		281
Vern — <i>Berkung LEPCHA</i>		
References — <i>Roxb Fl Ind Ed C B C 406 Voigt Hort Sub Cal 108 Kurr, For Fl Burm I 443 Gamble Man Timb 167; Balfour Cyclop III 206</i>		
Habitat. —A large tree found in the Eastern Himálaya and the Khásia Hills up to 4,000 feet also in Chittagong and Burma.		
Dye —The BARK is said to be used in Nepál for dyeing scarlet		DYE Bark
E elliptica , <i>Lindl Fl Br Ind, II, 372</i>		282
Syn — <i>MESPILUS CUILA Ham</i>		283
Vern — <i>Mihul mya NEPAL Yelnyo LEPCHA</i>		
References — <i>Gamble Man Timb 167 Don Prod Nep 238</i>		
Habitat. —A moderate-sized evergreen tree of the Eastern Himálaya from Nepál to the Mishmi Hills altitude 6,500 to 8,000 feet		
Structure of the Wood —Reddish brown compact hard apt to warp slightly it is good but not used Weight 58lb per cubic foot (<i>Gamble</i>)		TIMBER
E japonica , <i>Lindl Fl Br Ind II 372 Wight, Ic, t 226</i>		284
THE LOQUAT OR JAPAN MEDLAR.		285
Vern — <i>Lakote KAN</i>		
References — <i>Roxb Fl Ind Ed C B C 406; Voigt Hort Sub Cal 198 Brandis For Fl 575 Kurr For Fl Burm I 443; Gamble Man Timb 167 Dals & Gibs, Bomb Fl Suppl 32 Aitchison, Cat Pb and Sind Pl 58 Econ Prod N W P Part V 69; Lisboa U Pl Bomb 155, Birdwood Bomb Pr 150, Balfour Cyclop I 1052 Smith Dic 251 Treasury of Bot I 462 Mueller Sel Ext Trop Pl 293</i>		
Habitat —A handsome evergreen fruit tree introduced from Japan Extensively cultivated for its fruit		
Food —The <i>Loquat</i> tree is well known in gardens especially in Northern India By careful cultivation fruit of excellent quality can be obtained It is grown easily either from seed or by grafts the latter method being preferred The fruit ripens towards the end of the cold season There are two distinct varieties one pear-shaped and of a deep apricot colour the other roundish and white the latter kind ripens a few days later but is less sweet		FOOD 286
ERIOCHLOA , <i>H B & K, Gen Pl., III, 1099</i>		
Eriochloa annulata , <i>Kunth Duthie, Fodder Grasses N India 2,</i>	[GRAMINEÆ]	287
s	E 287	

**ERIODENDRON
anfractuosum****The White Cotton Tree.****FODDER
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Syn.—*E. POLYSTACHYA*, *H B & K*; *PASPALUM ANN BLATUM*, *Flagge*
Habitat.—A quick growing perennial grass found on wet ground in many parts of the plains

Fodder Eaten by buffalos In Australia it is said to afford fodder all the year round and to be highly relished by stock.

ERIODENDRON, DC Gen Pl, I., 210

(George Watt)

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Eriodendron anfractuosum, DC Fl Br Ind, I, 350,

THE WHITE COTTON TREE, KAPOK FLOSS [MALVACEÆ

Syn—*BOMBAX PENTANDRUM* Linn *B ORIENTALE*, *Spreng CRIBA PENTANDRA*, *Gartn*; *ERIODENDRON ORIENTALE* Steud, *E RHEEDI* Planch

Vern—*Hattian katan safed semal* HIND; *Shwet simul* BENG *Na vam* TAM *Buruga pār buruga sanna* TEL *Panid paniala* MAL *Khatyān sufid khatyān* DUK *Katsdoar* KHANDESH; *Shameula saphetāsāvara sāmālī* *pandhari savar* MAR; *Bul buruga, bul-barlu* KAN; *Imbul* SING (*elavum illaku*, TAM in CEYLON) *Thindawle* BURM

References—*Roxb Fl Ind Ed C B C* 513 *Vogel Hort Sub Cal* 105 *Grah Cat Bomb Pl* 17 *Dal & Gibs Bomb Fl* 22 *Wight & Arn Prod I* 61, *Wight Ic t 400 Griff Not IV* 533 *Bedome Flor Sylv XXX and Anal Gen t 4* *Hamilton (Gossypinus) in Trans Linn Soc XV* 126 *Thwaites Enum Ceylon Pl* 28 *Kurs For Fl Burm I* 131 *Moodeen Sheriff Supp Pharm* 135 also (new work proof sent to author) *Mat Med South India Gamble Man Timb* 42 *Report on Ind Fibres Col & Ind Exhib (1886)* 63 *Lisboa U Pl Bomb* 195 and 220, *Gray Botany of Bombay in Gasetteer XXV* 322 *Baden Powell Ph Prod* 333 *Murray Pl and Drugs of Sind* 56 *Drury U Pl Ind* 197 also *Handbook Fl Ind I*, 86; *Cooke Gums and Gum resins* 34 *Ainslie Mat Ind, II* 96 *Balfour Cyclopædia of India I* 1053 *O Shaughnessy Beng Disp* 227 *Dymock Mat Med West Ind 2nd Ed* 106 *Rheede Hort Mal III t 49, 50* *Rumph Amb I t 80* *Sir W Elliot Fl Andh* 32

Habitat—A tall tree with straight trunk prickly when young branches horizontal and whorled Flowers dirty white and much smaller than those of **Bombax** with staminal tube splitting into five portions each with two anthers instead of into many divisions each with one anther as in **Bombax** According to the *Flora of British India* this tree occurs in the forests throughout the hotter parts of India and Ceylon distributed to South America the West Indies and Tropical Africa

Although occasionally met with in most districts of India in only a few localities is it reported to be fairly abundant With the view of affording information as to the localities where an effort might be made to develop a trade in kapok fibre—the floss from the seeds of this plant—the following review of the official correspondence and writings of Indian authors may be given—

Of Bengal Roxburgh says: On the Coromandel Coast, the Tamils plant the tree about their temples In Bengal, where the winters are colder the leaves drop off during the hot season In February when destitute of foliage the blossoms appear and soon afterwards the leaves; the seed ripens in May The writer is not aware of having seen the tree in Bengal except as planted along road sides and in gardens **Mr Gamble** does not mention any special locality but remarks that it is "often planted"

Dr King in a list of the plants of the North West Provinces (printed in the *Gasetteer Vol IV p LXVIII*) simply mentions it by name In his *Forest Flora of North West and Central India*, **Sir D Brandis** makes no mention of the tree and **Dr Stewart** is also silent as to its occurrence in the Panjāb but **Mr Baden Powell**, in his *Panjāb Products*, mentions it

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**BENGAL,
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**N W P
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**PANJAB
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Kapok Floss.

(G Watt)

**ERIODENDRON
anfractuosum.**

briefly without stating where it is met with. It would thus appear that as far as these Provinces are concerned while the plant occurs occasionally under cultivation there is little or no prospect of a trade being done in the fibre from the wild or naturalised plant. Of Coromandel it may be otherwise. Roxburgh appears to have found it fairly plentiful. Sir Walter Elliot speaks of it as met with in that region and gives it the Telugu name of *Buruga*. Turning to Burma Kurz remarks that it is 'here and there cultivated in Pegu and Tenasserim a single tree was observed wild in the coast forests of South Andaman.' Mr Baden Powell, in a re-cast of Brandis's classification of the Burmese Teak forests mentions *Eriodendron* as occurring on the lower undulating hills along with bamboo *Xylia*, *Pterocarpus*, *Albizia*, *Terminalia*, *Dillenia*, *Hibiscus*, and *Bombax* (*Indian Forester* VIII 415).

In the Madras Presidency generally the tree would appear to be by no means of unfrequent occurrence. The Conservator of Forests Northern Circle says that except as a cultivated tree and in a few isolated cases in the South East Wynaad (Nilgiri District) he has not met with it in his circle. In the Salem District (Southern Circle) it is reported to be prevalent to a small extent on north-west slopes of the Sheveroy Range and scantily in other parts of the district. In the Hosur taluk scattered trees are met with towards the middle and low lands. From other districts in the South Circle it is reported that the tree is found chiefly in a cultivated state, especially near temples. In Tinnevely it is found scattered about in the Ghât forests and it is estimated that about three tons of cotton could be gathered yearly. In North Malabar the tree is found chiefly on the lower slopes of the Chenat Nair forests but there only at scattered intervals and it disappears further west and north where the rainfall is heavier. In Southern Malabar there is little trade in the silk cotton such trade as there is being more often in the cotton of the *Bombax malabaricum*. Dr Shortt (*Indian Forester* III 236) alludes to it in a list of plants parts of which are eaten in times of famine. He gives it the following names *Elevam*, *TAM* *Pur TEL*; and he remarks that it is found in gardens the seeds being roasted and eaten. Dr Moodeen Sheriff (in his forthcoming work on the *Materia Medica of South India*) gives a detailed account of the plant distinguishing it from *Bombax malabaricum*, but while he states that the cotton is always found in the bazars and is much cheaper than the common cotton he does not mention from what source it is obtained. In the Manual of Trichinopoly the tree is referred to in a list of the More important fruit and timber trees found in the district. It is said to be the *slavam* or *slava* of Tamil and the remark is made. The seeds are embedded in silky cotton which is used for stuffing beds cushions &c. In the Nellore Manual *Eriodendron* is given in a List of the Principal Trees of the District and receives the Telugu name *Buruga*. In the *Mysore Gazetteer* (Volume I 58) the tree is alluded to as grown in the Bangalore gardens but in a List of the trees of Mysore Mr Cameron gives it the Kanarese name of *Bili burga*. Dr George Bidie OIE in a Catalogue of the drugs of the Madras Presidency refers to the unripe fruits of this plant as being 'demulcent and astringent and used in medicine as well as cookery.' He gives the drug the following names—*Khatyan-kakalli DUK*; *Marati moggu, TAM* and *Buraga-pintha TEL*. At the Colonial and Indian Exhibition an interesting series of the products of this plant was shown contributed by Mr J W Cherry of the Forest Department from Salem.

Bombay—Sir George Birdwood in his *Bombay Products* mentions the plant as met with in Khandesh Travancore and Coromandel. It has been customary to read of the plant being, as far as India is

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MADRAS.
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**ERIODENDRON
anfractuosum****The White Cotton Tree****LOCALITIES
where met
with**

concerned most abundant in the Deccan. A recent correspondence would, however, appear to throw doubt on this prevalent opinion. Mr McGregor, Conservator of Forests Southern Circle, Bombay in a letter on the subject wrote that *Eriodendron anfractuosum* is said to occur in Kánara, but its occurrence is doubtful. He gave it the names of *Pandhari*, *savar* MAR and *Bili barlu* KAN. In the same correspondence the Conservator of the Northern Circle Bombay, was asked for information regarding the tree, and Mr A T Shuttleworth replied that *Eriodendron anfractuosum* though stated in some botanical publications to be a common tree in the forests of the northern circle is exceedingly rare, and in Khandesh where it is supposed to grow in large numbers there is scarcely a tree of the kind to be seen in the forests. Authors of works on the Forest Flora of Western India have evidently mistaken some other tree—probably *Bombax malabaricum*—for the Kapok or white cotton tree.

It would thus appear that there is room for doubt as to the existence in Bombay of *Eriodendron* as an abundant tree and much confusion appears still to prevail in the identification of the kapok tree. Popular writers are apparently unable to recognise it from *Bombax*. The vernacular names now given to the kapok tree might easily enough be adaptations from the names given to *Bombax*. The Sanskrit word *sálmali* is by some writers given to the one by others to the other. *Sálmali* wood is prescribed in the Institutes of Manu as that on which washermen should wash clothes. No writer definitely affirms that *Eriodendron* is wild, nearly all speak of it as cultivated and it may be the case that India can only hope to take part in the growing kapok trade after some years when the tree has been still further cultivated in some of the regions where it is now successfully grown. It would however be undesirable to accept as final the present information and as in a measure opposed to the opinions expressed by Mr McGregor and Mr Shuttleworth it may be as well to complete this brief review by quoting some of the passages in which it is affirmed that *Eriodendron* is a fairly common tree in both the southern and northern divisions of Bombay. Lisboa (*Useful Plants of Bombay* p 195) says It is a very common prickly tree with palmate leaves and dingy white flowers. There can be no mistake as to the plant there meant it is *Eriodendron* and not *Bombax*. Dalzell and Gibson also describe the tree in language which cannot be mistaken and they add It grows in Khandesh, its native name being *Shameula*. Dr Gray in his essay on the Botany of the Bombay Presidency (*Gazetteer* XXV 322) says that *Eriodendron* is another large tree (he has just been speaking of *Bombax*) similarly distributed in this country. It is known as the white silk-cotton tree. Of *Bombax* he says it is common in all the forests of the Presidency from Gujarat and Khandesh to Kánara. Turning now to the *Bombay Gazetteers* Mr Talbot in the Kánara volume says that *Eriodendron anfractuosum* is the *Bile burlu* of the Konkan and *pandhari* *savar* of MAR. He remarks that the white-cotton though fairly large, does not grow to the same size as *Bombax malabaricum*. The pods are gathered for their cotton. Of the Panch Maháls it is stated that the *Shamla* *Eriodendron anfractuosum* is similar in appearance to *Bombax malabaricum*, the *Shmal* or *Shmar*, but differs in the flower. Those of *Bombax* a dull crimson and those of *Eriodendron* a dirty white. The writer of the chapter on the Panch Mahál forests thus made no mistake and Mr Talbot's reputation as a botanist warrants the most complete confidence being placed on his statement that the tree occurs in Kánara. Of the Poona District it is stated 'Hattvan' *Eriodendron anfractuosum*, though not plentiful is found in the thicker forests on the western hills. The light and soft wood is

Kapok Floss

(G Watt)

ERIODENDRON
anfractuosum

used in tanning leather and for making toys. The fine soft silky wool which surrounds the seeds is used for making cushions. It yields a gum called *hattian-ke gond* which is valued in bowel complaints. Of the Khandesh District it is stated 'Katsdvar *Eriodendron anfractuosum*, sometimes called a *Bombax* and confounded with the *smal* has a white soft wood of no use save for making toys or fancy articles. The down round its seeds is used for stuffing pillows. It is not common anywhere in Khandesh.

Gum.—This gum is of a dark red colour and almost opaque. It is generally known as *hattian-ke gond* and by European writers is said to be one of the forms of the *Katéra* or hog gums e.g. the pseudo gums or those which are insoluble in water but swell and form a pasty mass. Accordingly Dr Cooke in his Report on the Gums of India places it along with the gums from *Cochlospermum*, *Gossypium*, *Sterculia urens*, and *Uvaria tomentosa*, but these being pale coloured it is assigned its more immediate position in the sub-series—the dark coloured pseudo-gums—such as *Moringa pterygosperma*, *Stereospermum suaveolens*, *Ailanthus excelsa*, *Macaranga tomentosa*, and *Bombax malabaricum*. This gum is however said to be astringent and to be employed medicinally in bowel complaints. Ainslie who wrote in Madras at the beginning of the present century says: A solution of this gum is given in conjunction with spices in certain stages of bowel complaints. We are told by Rumphius (*Amb I p 104 t 80*) who speaks of the tree under the name of *Eriophorus javana* that the inhabitants of the island of Celebes eat the seeds of it. It is the *Capock* of the Malay. Then follows a botanical description which shows that Ainslie clearly distinguished this plant from *Bombax*. This fact is of considerable importance as it confirms the suggestion already thrown out that the true Indian habitat of the plant may be Southern India. He gives the tree the Sanskrit name of *mullie* and adds that it is the *pania paniala* of the *Hort Mal* (*III p 59 t 49 50 51*). It is interesting to note that the name *kapok* (or *capock*) was known a hundred years ago and that it is a Malayan and not a Dutch name as some writers have stated. Only the other day a great advance was supposed to have been made by the discovery of the plant from which the Dutch fibre *kapok* was obtained. This fibre was well known to Ainslie nearly a century ago, and it is worthy of remark that the word *kapok* bears a close resemblance to the *karpasi* of the Sanskrit writers and that the most general modern names for the plant *Hattian* and *Kattan* seem to be directly derived from the Arabic *Kattan* both these classical names are however now stated to be synonyms for cotton. (Conf with the remarks at page 324 Vol I of the Selections from the Records of the Government of India.) Sir William O'Shaughnessy (*Beng Dispens 227*) also alludes to the gum as being medicinal.

Tan.—The wood is said to be used in tanning leather.

Fibre.—An inferior reddish fibre is sometimes prepared from the BARK which is used locally for making ropes and paper. This was analysed by Messrs. Cross Bevan and King and their results published in the recent report on Indian fibres, are as follows—moisture 12.4 per cent ash 9.5 per cent loss by hydrolysis (one hour's boiling in solution 1 per cent Na₂O) 50.5 per cent cellulose 33.6 per cent loss by mercersing 7.5 per cent and by acid purification 6.1 per cent. The ultimate fibres were only 1–2 mm in length. These figures may be accepted as fully disposing of the dark fibre of this plant from all further consideration. The barking of the trees should if possible be prohibited since the proceeds from the fibre thus obtained would by no means compensate for the injury done to the tree as a source of floss. The *Kapok* or *FLOSS* from the

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Wood
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FIBRE,
Bark.
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FLOSS.
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**BRIODENDRON
anfractuosum****The White Cotton Tree.****FIBRE.**

seeds is however according to the present demand a fibre of great merit. The modern trade in it was created by the Dutch merchants their supply being drawn from Java. It is used in upholstery being too short a staple to be spun, and indeed too brittle and elastic. But these are the very properties that commend the floss to the upholsterer. In cushions, mattresses &c its elasticity and harshness prevent its becoming matted as is the case with *sisal* floss and it is therefore considerably superior to that fibre. Indeed it is probable that the even still shorter staple of *Cochlospermum* would in time command a better price than that of the *sisal*. Like *Kapok* it is very elastic the fibre springing up to its former position the moment the weight is removed from the cushion. With *sisal* on the other hand a very short time suffices to make a mattress assume permanently a compressed condition in which it occupies perhaps less than half its original bulk and at the same time becomes knotted. This necessitates the removal of the stuffing to be teased or rudely carded.

It will thus be seen that if future extended usage of *Kapok* confirms the properties attributed to it the demand for the fibre will year by year increase. But while endeavouring to participate in this trade it becomes essentially necessary that an error made by many writers be guarded against namely that of viewing *Kapok* as a generic trade-name for all the silk cottons—including that of the *sisal*—the floss of *Bombax malabaricum*. When the demand for *Kapok* first started Indian exporters placed in the market a quantity of very dirty *sisal* having a large percentage of dust as well as seed. This was at once condemned and fetched a price that would not even cover the transport charges. India thus fell into an inferior position which it is possible might never have been the case had carefully cleaned *sisal* been sent to Europe. A low priced fibre like that of either *sisal* or *Kapok* cannot bear the extra freight of a large percentage of dust. It becomes essentially necessary that the floss be cleaned freed of seed and carefully baled. At the Colonial and Indian Exhibition a large assortment of *sisal* floss was shown and the writer had the opportunity of conversing with several Dutch and English dealers in *Kapok*. These gentlemen assorted the *sisal* samples and pointed to the fact that even among these there were inferior and superior qualities. Some had twice as long a staple as others while the *Kapok* property of elasticity was possessed by but few. After this had been done Mr. Cherry's true *Kapok* floss was shown when in every case the experts recognised it as *Kapok* and were eager to know the price amount available annually and the names of merchants with whom they might open up dealings. Unfortunately these were points regarding which no information could be furnished.

The necessity for care in future efforts may be apparent when it is here stated that nearly every trade journal which has published notices regarding *Kapok* has viewed it as one and the same thing with *sisal*. Thus the *Indian Agriculturist* (October 16th 1886) says that every person in India is familiar with the value of the 'tree-cotton' as stuffing for pillows and bedding and *Kapok* which is really the Malayan name for it is the designation by which it is known in the Dutch and Australian markets, &c. &c." The writer of that article was apparently very liberally compiling from a paper which appeared in *Buchanan's Monthly Register* (Melbourne, June 21st 1886) in which the tree-cotton—*Bombax malabaricum*—is incidentally mentioned along with *Cochlospermum Gossypium* and the *Baobab* tree of Africa as "in their growth and products" possessing 'very little difference'. Indeed it seems probable that as far as the Australian trade in *Kapok* from India is concerned, the floss of *Bombax*

The Kapok Floss.

(G Watt)

ERIODENDRON
anfractuosum.

malabaricum is that which is so designated While that may be so, the necessity for distinguishing the two fibres none the less remains in its full force, and the above reference to the *Indian Agriculturist* has been made in the hope of guarding against any ignorant or mistaken continuance of the error here indicated A reference was recently made by the Government of India to Her Majesty's Consul at Batavia, Java, asking the name of the plant from which the Kapok fibre was obtained and also whether the exports of the tree cotton obtained from the **Bombax** or **Eriodendron** trees are the larger The reply may be here published as it is highly instructive :—

" BRITISH CONSULATE ' BATAVIA

10th November 1887

" I have the honour to acknowledge receipt of your letter No 214—24 I F & S of the 29th September last and in reply thereto I beg to inform you that the scientific name of the tree from which Kapok is chiefly obtained in Java is **Eriodendron anfractuosum** The exports of Kapok from the Netherlands India have been as follows —

	Kilos		Kilos.
1882	302 201	1884	426 061
1883	341 136	1885	600 269 "

Thus there can no longer remain any doubt as to the Kapok of Java, and it is instructive to observe how the exports of that fibre have steadily increased having been in 1885 twice those of 1882 It is worth adding also that **Bombax malabaricum** is a native of Java, and apparently, a more abundant tree than **Eriodendron anfractuosum**

Oil of Eriodendron —The SEEDS are said to yield a bright red or dark brown clear oil Dr Oooke in his *Report on the Oils and Oil seeds of India* (p 43) mentions a sample as in the possession of the Indian Museum (obtained from Chingleput) and adds that the oil was first made known at the Madras Exhibition of 1857 The peculiar properties of this oil are unknown but from the fact that the seeds are often eaten it may be inferred that the oil is edible

Medicine.—It has already been stated that the GUM obtained from this plant is used medicinally in bowel complaints having attributed to it a useful astringent property Dr Moodeen Sheriff recommends the FLOSS or cotton for medicinal use as it is cheaper than common cotton It is also cooler and more elastic and on that account might be recommended for cushions and pillows used in hospitals and also for stuffing to bandages and other such surgical dressings The DRY YOUNG FRUITS have also been alluded to as used medicinally and Dr Moodeen Sheriff explains that the best mode of procuring them is to have them collected from the ground underneath the trees A large number of things are often sold as the fruits of this tree some even poisonous such as the unripe fruits of **Datura** By collecting them from the ground below the trees this is prevented but at the same time immature or rather unfertilized fruits would be so collected since if fertilized they would not fall to the ground These fruits are similar in their properties though inferior to those of **Bombax** The dry young fruits of **Eriodendron anfractuosum** are sometimes sold in the bazars under the same name *vs.* **Maráti Moggu** and used for the purpose of adulteration and substitution of those of **Bombax malabaricum**. Although the similarity between the fruits of both plants is very great yet the difference between their stalks which are almost always attached to them is so distinct that they can be very easily distinguished from each other The fruits of **Eriodendron** are always round not angled and somewhat larger and of a darker colour; the fruit-stalk of the **Eriodendron**,

FIBRE

OIL.
Seeds.
301

MEDICINE
Gum
302
Floss
303

Fruits.
304

ERIOGLOSSUM
edule.

The White Cotton Tree, the Ritha.

MEDICINE**Roots**
304 a

however is round about the thickness of a pin and two or three times longer than the fruit. These unripe fruits are regarded as demulcent and astringent. The exact original use of the expression *Marāṭi-Moggu* is not quite clear—*Moggu* means buds. The roots are also used medicinally being one of the forms of *Musla* or *Musli sémul* (described under *Bombax malabaricum*, Vol I, No B 653). Dr Dymock explains that in the Concan the young roots of *Eriodendron* are preferred to those of *Bombax*.

They are dried in the shade powdered and mixed with the juice of the fresh bark and sugar. This tree is called *Pándhra Saur* in Marathi and *Dolo Shamlo* in Guzerathi (*Mat Med West India 2nd Ed*, 106). The leaves and also the seeds have medicinal virtues attributed to them but they do not seem of sufficient merit to deserve separate description.

SPECIAL OPINIONS—§ A handful of the tender leaves of this plant is ground into a paste and is administered to a patient newly attacked with gonorrhœa. One dose at 6 A M is given daily for three or four days and a little butter milk is taken with it (*Surgeon W F Thomas Madras Army Mangalore*). The gum is also used in the incontinence of urine of children (*Surgeon Major F F L Rutton M D M C Salem*). 'The root of the young plant is used in the form of decoct on in cases of chronic dysentery and diarrhœa also in cases of ascites and anasarca when it acts as a diuretic' (*Civil Surgeon F H Thornton B A M B Monghyr*).

Food—The seeds are said to be eaten and the young or unripe fruits are also stated to be used in cookery. The seed cake is sometimes given as fodder. Dr Warden has kindly furnished the following note on this subject showing the comparative composition of Kapok to Cotton seeds—

§ The seeds of the Kapok tree have been made into cakes and the comparative value of these cakes and ordinary cotton seed cake for cattle feeding purposes has formed the subject of an enquiry by Mr G Reinders. The following analytical results were obtained—

	Kapok cake	Cotton cake		Kopok cake	Cotton cake
Water	13 28	12 0	Non nitrogenous ex		
Nitrogenous matter			traction	19 92	35 42
albuminous com			Woody fibre	28 12	20 36
pounds	26 34	20 62	Ash	6 52	5 64
Fat	5 82	6 36			

"The ash of the Kapok tree seed contains 28 5 % of phosphoric acid and 24 6 % of potash it ought therefore to be of value as a manure.

Structure of the Wood—Soft very light 30lb per cubic foot. According to some writers this is the *Salmali* of Sanskrit writers. It is used for toys and other such purposes and is sometimes hollowed out into canoes
(F F Duthie)

ERIOGLOSSUM, *Blume Gen Pl I 396*[t 73] **SAPINDACEÆ****310****Erioglossum edule**, *Bl Fl Br Ind I 672 Beddome, Fl Sylv*,*Syn*—*E RUBIGINOSUM Bl SAPINDUS RUBIGINOSA Bl**Vern*—*Rstha HIND, Mukta-moya URIYA Manipangam, TAM Isa hardsi undurugu TEL Tseichay BURM*

References.—*Roxb Fl Ind Ed C B C*, 332 *Voigt Hort Sub Cal* 94 *Brandis For Fl 108 Kura For Fl Burm I 296 Gamble Man Tsimb 94 Grnh Cat Bomb Pl 29 Dals & Gids Bomb Fl Suppl 14 Elliot Fl Andhr 71 186 Drury, U Pl 385; Lisboa, U Pl Bomb 52, Royle Ill Hsm. Bot, 138 Balfour, Cyclop III, 531 *Treasury of Bot 463**

Habitat.—A large tree of Sikkim, Assam, South India, and Burma**E 310****TIMBER**
309**310**

Eriolæna Fibre	(J F Duthie)	ERIOIÆNA Wallichii.
Structure of the Wood.—Strong and durable, with chocolate-coloured heartwood (Roxburgh)		TIMBER 311
ERIOIÆNA, DC ; Gen Pl , 220		
Eriolæna Candollei, Wall Fl Br Ind , I , 370 , STERCULIACEÆ		312
Vern —Bute BOMB Dwani BURM		
References.—Voigt Hort Sub Cal 108 ; Kurs For Fl Burm I , 148 , Gamble Man Timb , 51 Dals & Gibs Bomb Fl 24 ; Lisboa U Pl Bomb , 24 Burm Gas 127		
Habitat —A deciduous tree found in the Western Peninsula ; in Bhu tan and in Burma		
Structure of the Wood.—Heartwood brick red with orange and brown streaks old pieces, however losing their bright colour hard close grained shining takes a beautiful polish seasons well Weight about 50lb per cubic foot		TIMBER 313
It is used for gunstocks carpentry paddles and rice-pounders ; is very handsomely marked and is well worthy of greater attention		
E Hookeriana, W & A , Fl Br Ind I , 370		314
Vern —Bundân ost bulung, KOL Gua goli SANTAL ; Gua kasi MAL (S.P) Kutki bhonder GOND Arang BERAR ; Bute bother bothu arang BOMB Ponra ORAON , Nar bothu TEL Hadang KAN		
References —Brandis For Fl 36 Beddome For Man , 35 , Gamble Man Timb 50 Elliot Fl Andhr 129 Lisboa U Pl Bomb 24 Kew Reports 1879 34 Forest Admn Report Ch Nagpore 1885 28 Bomb Gas XV 68 XII 25		
Habitat —A small tree of Central and South India Behar and the Western Peninsula		
Fibre.—The BARK yields a good fibre of which fine specimens were sent to the Paris Exhibition of 1878 and by the Rev A Campbell to the Colonial and Indian Exhibition of 1886		FIBRE Bark 315
Structure of the Wood —Light red tough Annual rings marked by an almost continuous line of pores Said to be commonly used in the Kánara District for axe handles		TIMBER 316
E quinquelocularis, Wight, Fl Br Ind I , 371 Wight, Ic , t 882		317
Vern —Budjari dha mun BOMB		
References —Beddome For Man 35 Gamble Man Timb 50 Lisboa U Pl Bomb 25		
Habitat —A small tree found in Behar the Bombay Gháts and accord ing to Beddome very common on the Nilghiris and in the Wynaad widely distributed in the western forests of the Madras Presidency and in Mysore		
Structure of the Wood.—Said to be strong and to be used by the natives for various purposes		TIMBER 318
E spectabilis, Planch ; Fl Br Ind , I , 371		
References —Beddome Fl Syl An Gen t 5 ; Gamble, Man Timb 50		
Habitat.—A small tree of the Central Himálaya to Nepál It is also plentiful everywhere on the dry red clay hills in the arid districts of Manipur		
Fibre —The BARK yields a good fibre		FIBRE. Bark, 310
Structure of the Wood.—Heartwood hard and close-grained, reddish, mottled		TIMBER. 320 321
E Wallichii, DC Fl Br Ind , I , 370		
Vern.—Kubindé NEPAL		
References —Voigt , Hort Sub Cal , 108 ; Gamble, Man Timb 50		

ERUCA sativa.	The Bhabar grass.
TIMBER 322	<p>Habitat.—A small tree of Nepál and the Sikkim Himálaya. Structure of the Wood—Sapwood grey, heartwood reddish brown hard mottled much esteemed by Nepalese.</p>
323	<p>ERIOPHORUM, Linn <i>Gen Pl</i>, III, 1052 Eriophorum comosum, Wall, CYPERACEÆ Syn.—ERIOPHORUM CANNABINUM Royle SCRIPUS COMOSUS Roxb Vern.—Bábar bab babila bhabhur bhabhuri N W P; Pan babiyo (Almora) KUMAON References—Atkinson <i>Him Dist</i> 808 Royle <i>Ill Him Bot</i> 415; Royle <i>Fib Pl</i> 34 Huddleston <i>Trans Agri Hort Soc Ind VII</i>, 272 Balfour <i>Cyclop I</i> 1053 <i>Ind For IV</i> 168; IX, 569; Linn <i>Soc Jour XX</i> 409</p>
FIBRE 324	<p>Habitat—A coarse sedge-like perennial herb the heads of flowers clothed with long silky hairs Common in the Siwaliks and outer Himálayan ranges Allied to the Cotton grasses of Europe Fibre—The fibre yielded by this plant forms a very small portion of what is exported to the plains under the name of <i>bhabar</i> This latter is the produce of a grass named <i>Ischoemum angustifolium</i> The <i>Eriophorum</i> fibre is utilised locally but it is often difficult to discover whether it is pure or mixed with <i>Ischoemum</i> Former writers are in error who have attributed <i>Bhabar</i> entirely to <i>Eriophorum</i> Captain Huddleston in <i>Trans Agri Hort Soc Ind I</i> c mentions that All the <i>jhoolas</i> or rope bridges which are erected over the large rivers where <i>sanghas</i> or wooden planked bridges cannot be made on all the principal thoroughfares of this district are constructed of this silky species of grass the cables of which are of a considerable thickness This grass grows abundantly in all the ravines up the sides of the mountains and is to be had only for the cutting but it is not of a very durable nature though pretty strong when fresh made into ropes It lasts about a twelvemonth only or a little more and the people in charge of the rope bridges are constantly employed in repairing and annually renewing the ropes and stays The <i>chinkas</i> or temporary bridges of a single cable upon which traverses a seat in the shape of an ox yoke are also sometimes made of this grass For further information regarding <i>bábar</i> grass, see <i>Ischoemum angustifolium</i></p>
325	<p>ERIOSEMA, DC <i>Gen Pl</i>, I 543 Eriosema chinense, Vogel; <i>Fl Br Ind.</i>, II, 219; LEGUMINOSÆ Vern.—Konden SANTAL Reference—Rev A Campbell <i>Cat Econ Pl of Chutia Nagpur</i> 64</p>
FOOD 326	<p>Habitat—A perennial herb with tuberous root, common on the Central and Eastern Himálaya ascending to 6000 feet. Recorded as occurring also in Chutia Nagpur Burma and Ceylon Food—The Rev A Campbell states that the root is about the size of a marble, and is eaten by the Santáls</p>
327	<p>ERUCA, Tourn; <i>Gen Pl</i>, I, 84 Eruca sativa, Lam <i>Fl Br Ind I</i> 158 CRUCIFERÆ. Syn—BRASSICA ERUCA Linn; B ERUCOIDES Roxb. Vern—Taramira HIND Suffed shorshi shwet sursha BENG; Duan, sahwan tira tara taramira lalu N W P & OUDH Dua, chara, KUMAON Tara assu usaw jamnia PB Mandao AFG; Yambho, SIND Siddartha SANS Yambh PERS References—Roxb <i>Fl Ind Ed C B C</i> 497; Voigt <i>Hort Sub Cal</i> 72 Stewart <i>Pb Pl</i>, II; Atchison, <i>Cat Pb and Sind Pl.</i>, 7; Murray <i>Pl</i></p>

Taramira— <i>Eruca Sativa</i> . (7 F Duthie)	ERVUM Lens.
<p>and Drugs Sind 50; Atkinson Him Dist 708; Econ Prod., N W Prov, Part V 39 Duthie & Fuller Field and Garden Crops Part II, 26; Baden Powell, Pb Prod 419; Balfour Cyclop I 441; Oudh Gas I 498</p>	
<p>Habitat.—An erect herb closely allied to the mustards said to be a native of South Europe and North Africa. It is extensively cultivated as a cold weather crop in N W India and according to the <i>Flora of British India</i>, it is met with up to 10,000 feet on the Western Himalaya</p>	
<p style="text-align: center;">CULTIVATION</p>	<p style="text-align: center;">CULTIVATION N W P</p>
<p>North Western Provinces—"Its cultivation is most general in the western portions of the Provinces. It is most commonly grown mixed with gram or barley or the combination of gram and barley known as <i>bejhar</i> taking with these crops the place which rape fills in wheat fields. It is occasionally grown alone on land which has become too dry for the germination of any of the cold weather cereals and it is very frequently sown in cotton fields its seed being scattered over the ground before the cotton receives its first weeding in which process they are buried. No returns are available of the area on which <i>Duan</i> is grown mixed with rabi crops although it is known to be very large especially in the western districts. Taking into account only the land on which it is grown by itself or in company with cotton it is reported to occupy some 14 000 acres in the Meerut 17 500 in the Agra and 8 500 acres in the Rohilkhand Divisions. In the Allahabad Division it is only grown alone or with cotton on between 300 to 400 acres and in the Jhansi and Benares Divisions its cultivation seems to be almost unknown. <i>Duan</i> may be sown at any time between the beginning of September to the end of November and ripens about the same time as the rabi cereal harvest commences * * * When grown alone or with cotton its produce of seed per acre varies from 4 to 12 maunds (Duthie & Fuller, Field and Garden Crops II 26). Mr E T Atkinson says that about Almora it comes up accidentally with the other species of mustard but is also sparsely cultivated both in the hills and plains along the edges of corn fields</p>	<p style="text-align: center;">328</p>
<p>Panjab—In 1882 83 the total area under this crop was given as 210 000 acres in 1883 84 it was 253 000 acres and in 1884 85 it increased to 256 000 acres. When grown with peas or gram it is intended for fodder. In the Jhelum District it is not unfrequently sown into a poor <i>bajra</i> crop</p>	<p>PANJAB. 329</p>
<p>Oil—The oil expressed from the seeds of this plant is used chiefly for burning and resembles 'Roxburgh says 'Colza oil in all respects but in colour'. It is sometimes used by the natives as a hair oil and to a certain extent as food. The cost is from 3 to 10 seers per rupee" (Balfour Cycl). In Southern Europe it is said to be used as a salad oil</p>	<p>OIL Seeds 330</p>
<p>Food.—Stewart remarks that the young plant is used as greens as in France. The oil is sometimes employed in the preparation of sweet meats.</p>	<p>FOOD 331</p>
<p>Fodder—<i>Usan</i> is largely grown in the Panjab to be used as green fodder for cattle camels, and goats. In some districts it is cultivated during the hot weather and given mixed with bruised barley as a cooling food to buffalos. According to Dr Stocks the oilcake is universally used for oxen camels goats and sheep</p>	<p>FOODER 332</p>
<p>Conf with account of <i>Brassica</i>, Vol 1, pp. 520-534.</p>	
<p>Ervalenta, see <i>Lens esculenta</i>, <i>Manch</i></p>	
<p>Ervm Lens, <i>Linn</i>, see <i>Lens esculenta</i>, <i>Manch</i>.</p>	

**ERYTHRINA
arborescens.****Erythraea**—a Substitute for Chiretta.**ERYCIBE, Roxb Gen Pl, II, 868**

333

Erycibe paniculata, Roxb ; Fl Br Ind IV 180, CONVULVULACEÆ**Vern**—Urumin KOL Karı SANTAL Attia-maeriyā SING**References**—Roxb *Fl Ind Ed C B C* 197 Voigt *Hort Sub Cal* 441; Brandis *For Fl* 344 Kura, *For Fl Burm II* 214 Gamble *Man Timb* 273 Thwaites *En Ceylon Pl* 213, Dals & Gibs *Bomb Fl* 169 Rheede *Hort Mal, VII* 73 t 39 *Journ As Soc, Pt 2 No 2* 1867 80 *For Adm Report Ch Nagpur* 1885 32**Habitat**—A diffuse or sub scandent shrub or an erect tree 40 feet high found throughout India from Oudh eastward and southward to Ceylon Tenasserim and the Nicobars**Medicine**—The Rev A Oampbell mentions that in Chutia Nagpur the BARK is given for cholera**MEDICINE
Bark**

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ERYNGIUM, Linn ; Gen Pl, I 878

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Eryngium cœruleum, Bieb ; Fl Br Ind II, 669 UMBELLIFERÆ**Syn**—ERYNGIUM PLANUM Lindl in Royle III 232 (not of Linn)**Vern**—Dhudhalı HIND Poli mittua handu pahari gajar nurālam PB Shakakul misri ARAB Gurs-dusti PERS**References**—Stewart *Pb Pl* 105; Aitchison *Cat Pb and Sind Pl* 67 Royle III *Him Bot* 232**Habitat**—A glabrous perennial herb with spinescent glaucous leaves found wild in Kashmır up to 6 000 feet**Medicine**—The ROOT is considered to be aphrodisiac and to act as a nervine tonic In Kandahar the SEEDS are said to be officinal**SPECIAL OPINION**—§ The root is much used on account of its supposed aphrodisiac properties (Civil Surgeon F Anderson M B Bijnor)**MEDICINE
Root**

336

Seeds

337

ERYTHRÆA, L C Rich Gen Pl II 809

338

Erythræa Roxburghii, G Don Fl Br Ind IV 102 Wight,**Syn**—CHIRONIA CENTAURIODES Roxb**Vern**—Charāyatak HIND Girmı gıma BENG Gada sigrık SANTAL Luntak kurunai kadavi nai BOMB Yanglı karıatu GUZ**References**—Roxb *Fl Ind Fd C B C* 196 Dals & Gibs *Bomb Fl* 157 Pharm *Ind* 150 O Shaughnessy *Beng Dispens* 461 Moodeen Sheriff *Supp Pharm Ind* 99 Dymock *Mat Med W Ind* 2nd Ed 541 S Arjun *Bomb Drugs* 90 Drury *U Pl*, 198 Lisboa *U Pl Bomb* 262**Habitat**—A slender annual with rose-coloured flowers found throughout India, ascending to 2 000 feet from the Panjāb and Bengal to Travancore**Medicine**—The whole plant is powerfully bitter and may be substituted for chiretta when the latter is not available According to Rev A Oampbell it is used by the Santāls in fever**MEDICINE**

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ERYTHRINA, Linn Gen Pl, 531The *Erythrinæ* are mostly trees or shrubs rarely herbs They are chiefly remarkable for their brilliantly coloured red flowers which are usually produced before the new leaves are developed

[LEGUMINOSÆ]

340

Erythrina arborescens, Roxb ; Fl Br Ind, II 190**Vern**—Dingsong KHASIA Rodinga fullidha NEPAL Gyessa LEPCHA Rungara, KUMAON**References**—Roxb *Fl Ind Ed C B C* 544; Voigt *Hort Sub Cal* 237; Brandis *For Fl* 140; Gamble *Man Timb*, 122, Balfour, *Cyclop., I*, 1054

The Indian Coral Tree.

(*f* F Duthie)

ERYTHRINA
indica.

Habitat.—A small or moderate-sized tree found in the outer Himálaya from the Ganges to Bhután up to 7 000 feet and in the Khásia Hills.

Structure of the Wood.—Similar to that of *E. suberosa* and *indica* but is more compact, less spongy, and has more numerous concentric bands of soft texture.

Erythrina indica, Lam ; Fl Br Ind II, 188, Wight, Ic., t 58
INDIAN CORAL TREE, MOCHI WOOD

Vern.—*Pangra, panyira, pangara pharad pangrá mandára*, HIND ; *Palita mandar, palitá-maddr* BENG *Birsing* KOL ; *Kathnik, MAGH ; Marur-baha* SANTAL *Chaldua paldua URIYA Madar* CACHAR ; *Pangra* BERAR *Pángará phandra pangaru* MAR ; *Panarawo panarwo*, GUZ *Muruká kalyánd-murukku kalayána murukku, murúka* TAM *Bariyamu, badapu modugu badidapu bariyapu, bádisé mahé meda* TEL *Háiwára halwána páiwára paravala-damara* KAN *Dudap* MALAY *Penlaykathit kathit* BURM *Errabadu, SING Palimandár*, SANS

References—*Roxb Fl Ind Ed C B C 541 Voigt Hort Sub Cal 237 Brandis For Fl 139 Kuntz For Fl Burm I 368 Beddome Fl Sylv 87 Gamble Man Timb 122 Dals & Gibs Bomb Fl 70 Rheede Hort Mal, VI t 7 Elliot Fl Andhr, 19 20 23 110 U C Dutt Mat Med Hind 308, Bidie Cat Raw Pr Paris Exh 52 Irvine Mat Med Patna 89 Lisboa U Pl Bomb 59, Bird wood Bomb Pr 329 Cooke Gums and Gum resins 17 McCann Dyes and Tans Beng 66 Liotard Dyes 33 Liotard Paper making Mat 11 Watson's Report on Gums 18 34 Gums & Resinous Prod P W D (1871) 14 59 Balfour Cyclop I 1055 Smith Dic 132 Treasury of Bot I 468 Kew Off Guide to the Mus of Ec Bot 43 Bomb Gas XV Pt I 68 XIII Pt I 26*

Habitat—A moderate-sized quick growing tree with straight trunk which is usually armed with prickles when young It occurs throughout India from the foot of the Himálayas and in Burma Often grown in gardens.

Gum—It yields a dark brown gum of little importance

Dye and Tan—The dried red FLOWERS on being boiled yield a red dye The BARK is also said to be used in dyeing and tanning

Fibre.—The Rev A Campbell (*Chutia Nagpur*) states that the BARK yields an excellent cordage fibre of a pale straw colour

Medicine—The BARK is used medicinally being antibilious and a febrifuge It is also useful as a collyrium in ophthalmia The JUICE of the leaves taken in a dose of two ounces is considered as a good vermifuge and cathartic Dr Kani Lal De OIE says that the LEAVES are applied externally to disperse venereal buboes and to relieve pain on the joints

SPECIAL OPINIONS—§ Inner side of the bark is smeared with *ghí* and held over the flame of a lamp the soot thus deposited is used in watery eye being applied to the inner side and edges of the lower lid (*Assistant Surgeon Anund Chunder Mookerji Noakhally*) Used as an anthelmintic The fresh juice of the leaves is used in conjunctivitis Soot deposited on the raw surface of a fresh piece of the bark is a useful application in tinea-tarsi and purulent ophthalmia The fresh juice of the leaves is used as an injection into the ear for the relief of earache and as an anodyne in toothache (*f* H Thornton BA MB Monghyr)

Food.—The tender LEAVES are eaten in curry

Fodder—The LEAVES are used as cattle fodder in the Trichinopoly District

Structure of the Wood.—Rather durable though light and open-grained it does not warp or split, and takes a good varnish Structure the same as that of *E. suberosa*.

It is used for light boxes, toys, scabbards, trays, as well as for fire-

TIMBER.
341

342

GUM

343

DYE & TAN
Flowers

344

Bark

345

FIBRE

Bark

346

MEDICINE

Bark.

347

Juice

348

Leaves

349

FOOD.

Leaves.

350

FODDER.

Leaves.

351

TIMBER

352

ERYTHROXYLON Coca.

The Coca Plant.

DOMESTIC
353

wood Carpenters prefer it to all others for the poles of palanquins. According to Brandis it is used for much of the lacquered ware of different parts of India. In Madras it is known as *mochi* wood and according to Wight is generally employed for constructing catamarans.

Domestic Uses.—It is said to be largely planted in Bengal and South India to support and shelter the betel and black pepper vine. It is also used for hedges.

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Erythrina stricta, Roxb. *Fl Br Ind*, II, 189

Vern.—*Falleto fulidha* NEPAL; *Mourscon kichga* KAN; *Taung kathit* BURM.

References—Roxb. *Fl Ind Ed C B C* 542; Voigt *Hort Sub Cal* 237; Kura *For Fl Burm I* 369; Beddome *Fl Sylv t* 175; Gamble *Man Timb*, 122; Dals & Gbs *Bomb Fl* 70; Balfour *Cyclop I* 1055; *Ind For XIV* 391.

Habitat—A large tree with pale coloured prickles when young is found in Burma and the western half of the Peninsula.

TIMBER
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Structure of the Wood—Soft resembling that of *E. suberosa* it is sometimes used for planks.

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E. suberosa, Roxb., *Fl Br Ind II* 189

Vern.—*Pangra dauldahk rāngra rowanra nasūt maddra* HIND; *Farkud KHARWAR*; *Mandal GAR*; *Fullidha* NEPAL; *Katiang* LEPCHA; *Phangera* GOND; *Gūlnashtar pariara thab* PB; *Gada phassa* KURKU; *Nangthāda* MELOHAT; *Pangra KIN*; *Pangā a* DEC; *Mandal GARO*; *Muni maduga* TAM; *Mulu modugu badadam* (var *sublobata*) TEL.

References—Roxb. *Fl Ind Ed C B C* 543; Voigt *Hort Sub Cal* 237; Brandis *For Fl* 140; Kura *For Fl Burm I* 369; Beddome *For Man* 87; Gamble *Man Timb* 121; Grah, *Cat Bomb Pl* 57; Dals & Gbs *Bomb Fl* 70; Atchison *Cat Pb and Sind Pl* 47; Elliot *Fl Andhr* 19 119 (var *sublobata*); Atkinson *Him Dist* 309; Balfour *Cyclop I* 1055; Ray *Gas* 35; *Bomb Gas XV* 68.

Habitat—A moderate-sized deciduous tree of the Himālaya from the Ravi to Bhutān up to 3 000 feet and extending to Central and South India and Burma. *E. sublobata*, Roxb. is only a variety with larger and lobed leaflets.

TIMBER
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Structure of the Wood—Very soft spongy white fibrous but tough darker-coloured near the centre but no regular heartwood. It is used for scabbards, sieve-frames and occasionally for planking.

(F. Murray)

ERYTHROXYLON, Linn., *Gen Pl I* 244

A genus of shrubs or trees containing about 50 species, natives of warm countries—10 in Africa, 6 in India and Ceylon, 1 in Australia, and the rest in America. The generic name has been given in allusion to the red sandal-like wood which the majority possess.

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Erythroxylon Coca, Lam. *Bent & Trim Med Pl t* 40. LINNÆ

References—DC *Origin Cult Pl* 135; U. S. Dispens. 15th Ed. 563; *Bent & Trim Med Pl* 40; Warden *Prof. Chemistry Calcutta*—Note on *Erythroxylon Coca* as grown in India; *Agri Hort Soc Year VIII Pt II* (new series) 1888 pp. 127–170; *Kew Bulletin January 1889*; *Christy Com Pl and Drugs* No 3 24 No 4 43 No 5 55 No 6 85 No 7 45 No 8 47 No 9 62; *Sponz Encyclop* 1307; Balfour *Cyclop* 1055; *Treasury of Bot* 469; Weddel *Voyage dans le Nord de Bolivie* (Paris 1853); Johnstone *Chem. of Common Life* Ed. Church 357; Watts *Dic of Chem I* 1059; Gosse *Mémoires de l'Erythroxylon Coca* (1861); Christison *Brit Med Journ April 29 1876*; Crookman in *Journal Pharm Society April 23rd 1887*; Dowdeswell in *Lancet April 29 1876*, and May 6, p. 664; Bidu *Pamphlet on Erythroxylon Coca*.

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The Coca Plant. (J. Murray)

ERYTHROXYLON
Coca.

Madras March 1885, Rusby "The Cultivation of Coca," *Therapeutic Gazette*, January 1886.

Habitat.—A shrub, 2 to 6 feet high, much branched, somewhat resembling the black thorn.

It is found in Peru, Bolivia, Brazil, the Argentine Republic, and other parts of South America, growing from 2 000 to 8 000 feet above the sea level but according to De Oandolle the plant is indigenous only to the two former countries. It is an escape from cultivation as generally met with in other parts of America and is cultivated in various parts of India and Ceylon. In a recent pamphlet on Coca (*Kew Bulletin* of January 1889) two distinct varieties are described —

(1)—The typical E. Coca, *Lam*

(2)—E. Coca, *var. novo-granatense*.

An intermediate form is provisionally adopted as exhibiting the general characteristics of Bolivian Coca. According to the *Bulletin* the second variety is the plant figured by Bentley and Trimen. Leaves received from Ceylon corresponded with those of the typical E. Coca while those from India exhibited the characters of the variety *novo-granatense*, or of the intermediate form the Bolivian Coca.

History.—The name *Coca* sometimes called *Cuca* is a corruption of the Aymara Indian word *Khoka* signifying plant *the plant par excellence*.

The natives of Peru have utilized this bush from the earliest period and its employment was general at the time of the conquest of that country by Spain. From Peru (and according to De Oandolle from Bolivia also) it seems to have spread over the other parts of South America, where the cultivated plant is now to be found in all localities the natural conditions of which allow of its growth. The exact date of the introduction of Coca into England is not known but it was probably not much before the year 1870.

Introduction into India.—Coca in 1870 was introduced into Ceylon from Kew and from the Peradeniya stock have been derived the plants now in that island. It seems probable that from this same source came also the plants originally grown in the gardens of the Agri. Horticultural Society of Madras, and these furnished some of the first plants cultivated in India.

At a meeting of a Committee of that Society held in May 1876, a letter was read from Mr. Joseph Stevenson suggesting that the propagation of the plant might be attempted as it then had become evident that Coca, the wonderful *sustaining* effects of which were beginning to be recognised in Europe, would rapidly become an important article of commerce. No steps of any importance however seem to have been taken till 1885 when owing to the discovery of the value of *Cocaine* as an *anæsthetic* the demand in Europe for the Coca leaf was rapidly increased. As a consequence applications for the plant became very numerous and, as far as the limited supply from a single specimen in the Madras Gardens allowed, seedlings were distributed amongst planters and others in various parts of the country. In 1885-86 the Agri. Horticultural Society of India distributed young plants from the Calcutta Gardens to the tea-growing districts *i.e.*, Assam, Cachar, the Duars, Darjeeling, Terai, and Jaunpore. Certain cultivators at Ranchi obtained seeds direct from Paris.

In 1885 the Government of India addressed Her Majesty's Secretary of State for India with a view of ascertaining the method of preparation of the leaf as pursued in South America. This resulted in accounts of the methods pursued from Surgeon General Balfour and Mr. W. T. Thielton Dyer the latter reporting that the method described by Deputy Surgeon General G. Bidie O'Leary, in his lecture at Madras in March 1885, left nothing to be added.

Owing most probably to the great increase in exportation of the plant

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ERYTHROXYLON**Coca****The Coca Plant.****HISTORY**

from South America and its consequent cheapening in the European markets Coca cultivation in India has not materially developed since its introduction. Indeed of the tea districts of Ceylon Madras Mysore, and Bengal it may practically be said that it is now as it was three years ago, grown only experimentally.

CULTIVATION**CULTIVATION
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Method followed at the source of supply — The *Tropical Agriculturist* of November 1885 publishes an account taken from *The Ephemeris* of which the following may be given as the substance —

Coca is grown on terraces on the sides of deep narrow valleys between the heights of 3 000 and 6 000 feet. In August the seeds are sown in boxes or beds and in June they are transplanted to the hill terraces and deposited about three feet apart. The soil must be rich in vegetable manure and free from weeds the crop in other words is an exhausting one necessitating virgin soil. In consequence a forest clearing is generally chosen the ground being already rich in decayed vegetable matter.

Dr Warden in his note on *Erythroxylon Coca grown in India* writes —

From a high altitude the best results as to total alkaloids have been yielded by plants grown on a hill side soil rich in vegetable manure. But a rivalry exists between this variety of soil and a yellow clay. The author is inclined to think that those who prefer the latter soil do so because it yields a somewhat larger crop.

The ground for the nursery beds is prepared during the latter part of the dry season by breaking it up very thoroughly to the depth of a foot or more. The plan of sowing the seeds broadcast as soon as gathered and covering with a little earth or better a layer of banana leaves or decaying vegetable matter has been found to answer. Germination requires from eight to twelve days longer than by adopting the native method which consists in depositing the seeds as soon as gathered in a shaded place in layers an inch or more deep and covered with a thin layer of decaying leaves. The heat generated by the decomposition of the fleshy pericarps seems to induce germination and the embryo bursts its bony covering. This growth unites them in from eight to fourteen days into a solid mass which is broken up into small pieces and planted in furrows in the nursery. In this process very many of the sprouts are broken off and the plants destroyed. A covering of brush or straw must be placed over the nursery at first only three or four inches above the surface and elevated as the plants grow.

On the manner in which the ground is prepared for the plantation much of the future well being of the plant depends. The ground should be thoroughly powdered to the depth of two or if possible three feet and all roots and large stones removed. It is generally believed that shade tends to the production of the best quality of leaves and the cocales are therefore planted thickly with a small broad topped leguminous tree related to the St John's head plant. The custom appears to have arisen from two considerations. There is a period already referred to of two or three months during which no rain falls; and then these trees afford protection from the sun. Secondly because shade conduces to the production of a large smooth leaf of elegant colour and thus adds to the appearance of the product. From repeated comparative assays made by Rusby of shade and sun grown leaves from adjoining plants the sun grown leaves were invariably much richer in total alkaloids.

The plants are transplanted from the nursery at the advent of the permanent rains, and are set out from half an inch to three feet apart. They grow to a height of two to six feet but the largest plants do not yield the

The Coca Plant. (J Murray)

ERYTHROXYLON
Coca.

**CULTIVA-
TION**

best leaves Great care must be taken to keep the soil thoroughly stirred and free from weeds (*Four Agri Hort Soc Vol VIII., Pt II New Series p 149*)

Most American writers appear to hold that the plant is better cultivated in the open than in the shade an opinion which the above chemical analysis would seem to corroborate On the soil becoming exhausted fresh plantations are opened out in the forest, in preference to resorting to manure

In India.—The following interesting facts regarding the effects of manure are given by Dr Warden in the paper already quoted :—

As regards the effects of cultivation and manure on the yield of alkaloid it would appear from the reports I have received that in only two of the districts was the soil specially manured At Arcuttipore, the manure consisted of old cow-dung with a top dressing of soot In the Jaunpore district the soil is stated to have been highly manured but no particulars as to the precise nature of the fertiliser are afforded The leaf grown at Arcuttipore yielded very considerably more alkaloid than any of the other samples examined while that grown in the Jaunpore district contained only 57½ per cent of alkaloid I have no information whether the Arcuttipore plants were grown in the shade or open On the Jaunpore Tea Estate there appear to be four plants two in full sun-shine and measuring 5½ feet and 5 feet 2 inches in height respectively one in partial shade 3 feet high, and one in shade 5 feet high and I gather from the Manager's letter that the leaf sent me was collected from the plant which grew in the shade

Taking into consideration the amount of potash contained in the leaves and the rapid exhaustion of the soil which would necessarily ensue from repeated plucking of the leaves it appears to me that though at first a nitrogenous fertiliser would be beneficial yet after a time the addition of a fertiliser containing potash in some form in addition to nitrogenous matter would be necessary The amount of nitrogen in the soot or cow dung might possibly suffice but whether the amount of potash in the cow-dung would be sufficient to supply the place of that removed from the soil by the leaves is an open question (*l c p 153*)

From reports furnished at various times to the agricultural journals it appears that the slightest degree of frost is fatal to the plant—at least during its infancy For this reason experiments in the tea plantations on the higher Himálaya have been unsuccessful but more encouraging reports exist of its cultivation at lower altitudes in India as, for example from about 100 feet to 2 000 feet above the sea level

The essential conditions seem to be —

(1) a rich soil preferably of virgin forest; (2) a considerable rainfall, (3) a complete absence of frost (4) a careful system of cultivation paying special attention to weeding

SPECIAL REPORTS.—The Conservator of Forests Southern Circle Madras writes — This Circle has not got beyond the experimental stage No regular areas have been planted In Wynaad the planters have a few plants here and there but apparently more as curiosities than anything else and the Forest Department there has about one hundred plants The District Forest Officer has observed that it seeds less freely in Wynaad than on the coast The Deputy Conservator of Forests Coorg reports — Coca has only been cultivated in gardens in Coorg Flowers and fruits in Mercara. It seems doubtful if its cultivation would pay

COLLECTION AND MANUFACTURE

In Peru and Bolivia two crops are gathered the first the March

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TURE**
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In India

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The Coca Plant.

COLLECTION AND MANU- FACTURE

crop " commences in January the second, the ' St John's " crop begins in May The first picking of leaves is made one year and a half from the date of transplanting During the first five years the percentage of the alkaloid cocaine yielded by the leaves increases rapidly reaching its maximum about the tenth year The plant retains its full productive power till about the twentieth after which it slowly declines till about the fortieth year probably owing to exhaustion of the soil

The women and children collect the mature leaves which are known by being bright green on the lower and yellowish on the upper surface Each leaf is picked separately and very carefully and every precaution is taken not to touch the top of the bush The leaves are then conveyed to the place of preparation where they are laid out in a single layer on a pavement, kept scrupulously flat and clean which has been previously heated by the sun The necessity of the pavement being already hot is greatly insisted on The leaves are stirred occasionally until dry which they become in about three hours They are then either placed for a short time in storage houses where they undergo a slight sweating process or are at once packed The slightest amount of moisture is fatal to the leaf after being dried The leaf should therefore always be packed in zinc or tin lined air tight boxes

In India several methods of drying artificially in tea driers or charcoal *chulas*, have been experimentally tried According to Dr Warden the results by all are equally good

He writes — The object which should I think be kept prominently in view is to dry the leaves as thoroughly and quickly as possible at the lowest temperature The plan adopted at Arcuttipore of first withering the leaves in the shade and then drying them in a tea drier at 150° Fh for 10 minutes appears to me as good as any I do not think any advantage is to be gained by employing a higher temperature In whatever way dried the leaves should be at once packed in air tight boxes directly they are cold

MEDICINE Leaf 363

Medicine — From the earliest dates the Indians of Bolivia Peru and Brazil have ascribed marvellous properties to the LEAF of the **Coca** plant Chewed either alone or mixed with lime or taken in various forms of syrup and decoction the consumer is enabled to sustain the greatest fatigue and hardship without either food or sleep for a lengthened period The drug is also said especially when taken as an infusion or decoction to prevent difficulty of respiration in ascending hills Consumed in any form it produces a peculiar excitement slow and sustained and diffused generally over the nervous system accompanied by a general feeling of well being When eaten along with tobacco it is reported to produce a condition of intoxication very similar to that caused by alcohol or Indian hemp Prolonged or excessive use of the drug is followed by much the same results as over indulgence in opium The **Coca** eater loses his appetite suffers from impaired digestion and when not under its influence becomes phlegmatic and apathetic According to Johnston in his *Chemistry of Common Life* quoting Von Tschudi The inveterate Coquard (or **Coca** eater) is known at the first glance His unsteady gait his yellow skin his dim and sunken eyes encircled by a purple ring his quivering lips and his general apathy all bear evidence of the baneful effects of the **Coca** juice when taken in excess Von Tschudi however states as the result of his inquiries that the moderate use of **Coca** is not merely innocuous, but that it may even be very conducive to health

Dependent on these properties the infusion of **Coca** is viewed as a valuable remedy in asthma and colic and that the leaves applied externally as a plaster to cure boils and ulcers

The Coca Plant.

(J. Murray)

ERYTHROXYLON
Coca.

The Indians of Peru probably influenced by their experience of the wonderful properties of the leaf are said to regard it as sacred. Its use is much intermingled with their religious rites and to the plant itself worship is rendered.

Since the introduction of the leaf into Europe many writers have extolled the advantages to be derived from the drug and actual experiments by Sir Robert Christison and others have shown that it possesses nearly if not quite, all the qualities ascribed to it by the Indians. In 1860 Neimann separated the now very important alkaloid *Cocaine* from the leaf and described it as producing insensibility to the tongue when applied to it. This important fact seems to have lain dormant till 1884 when Herr Koller a medical student in Vienna rediscovered this valuable anæsthetic action of the alkaloid. It is now most extensively employed as a local anæsthetic in many minor operations and is specially valuable in ophthalmic surgery since it produces complete insensibility to pain in the superficial structures of the eye. It is also mydriatic and paralyses the accommodation. *Cocaine* seems to act by paralysing the termination of the sensory nerves in any structure to which it is applied but this paralysis remains purely local and does not last long. Indeed this limitation of its action to the tissues to which it is directly applied is the most valuable property of the drug; as an external remedy for painful diseases of the skin or mucous membrane it is therefore most useful.

Chemistry — The *Coca* leaf is said to contain the following principles the alkaloid *Cocaine*, *Hygrine*, *amorphous Cocaine*, *Egonin*, *coca tannin*, and a *peculiar wax*.

From recent researches however it would appear that the amorphous cocaine formerly described is in reality a solution of cocaine in the volatile oily body *hygrine* (*Stockman Journal Pharm Society April 23rd 1887*). Regarding *egonin* it appears that it also does not exist ready formed in the leaves but is a product of the decomposition of *Cocaine* (*Dr Warden's notes on Erythroxylon Coca grown in India—March 1888*). The further elucidation of this question is to be hoped for as the cocaine of commerce at present seems to vary much in character and a more exact knowledge of its true chemical nature is required to determine whether the amorphous substance often connected with the alkaloid and its salts may not be the cause of the objectionable effects which some times follow its use. Excluding these doubtful substances therefore there remain to be considered the alkaloid cocaine, hygrine, coca tannin and the wax —

I COCAINE — $C_{17}H_{21}NO_4$ (*Zornen*) Has been generally described as possessing all the properties of an alkaloid and as crystalline. Dr Warden's recent analyses however show that the alkaloid obtained from the leaves of *E. Coca* grown in India possess the marked peculiarity of in no single instance shewing any tendency to spontaneous crystallization. But this result is at variance with the analyses of Mr Alfred G Howard F.O.S. given in the *Kew Bulletin* already referred to. That chemist found that the leaves received from Darjiling, Bogracote, Alipore and Ranchi yielded from 23 to 45 per cent of crystallisable cocaine and from 17 to 35 per cent of the uncrystallisable alkaloid. The leaves from Ceylon on the other hand which belonged to the typical *E. Coca*, were found to contain from 47 to 60 per cent of crystallisable and no uncrystallisable cocaine. The alkaloid forms salts, of which the citrate, salicylate and hydrochlorate are used in medicine. It is very sparingly soluble in water (1 in 700 parts), more so in alcohol and freely so in ether and volatile oils. It is also soluble in fats. The fact of its being soluble in ether while its salts are not is taken advantage of in the preparation of the pure alkaloid.

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CHEMISTRY

It has a bitterish taste and crystallizes in small shining monoclinic prisms. The pure alkaloid is much used in medicine especially in the manufacture of oleates and ointments for which it is more suitable than its salts, owing to its solubility in fats and oils. The amount of the alkaloid obtainable from the leaf of commerce is variously stated as from 2 to 5 per cent.

Hygrine
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2 **HYGRINE**—is described by Wholer and Lossen as "a pale yellow volatile, oily body giving the ordinary reactions of alkaloïds hygroscopic and forming hygroscopic salts which crystallize with great difficulty."

Coca tannin
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3 **COCA TANNIN**—resembles the tannin of tea in giving a deep brownish green colour with the persalts of iron. It has been found to vary much in quantity in the different leaves examined in this country. Dr Warden writes—It is of interest to note that the largest deposits of *coca tannin* occurred in those samples which yielded the highest percentage of alkaloid. It appears to me therefore as not improbable that in the leaves the *cocaine* is in combination with the acid to which this term of *coca tannin* has been applied.

Wax
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4 The wax is unimportant. Dr Warden in his paper above quoted gives a number of very interesting analyses of leaves grown in different parts of India from which it would appear that the percentage of *cocaine* is higher than that recorded in any previously published assay. Those which yielded the best results were leaves from Ranchi Arcuttipore and from the Central Terai Tea Co. They contained an average percentage on the anhydrous leaf of over 1 the highest being 1.671. Though as above noted the physical character of the alkaloid obtained by Dr Warden differs from that of the American leaf it has been proved that it is equally efficacious as a local anæsthetic. Dr Saunders Professor of Ophthalmic Surgery at the Medical College Calcutta used a 4 / solution in thirteen cases of operation for cataract and many minor operations and found that it differed in no way from other *cocaine* except that it appeared to have a quicker and slightly stronger action. Should Warden's analysis be confirmed that the cocaine of the Indian plant neither spontaneously crystallizes itself nor possesses spontaneously crystallizable salts it might be objected to on purely pharmaceutical grounds but it is to be remembered that the salts of the alkaloid are mainly used in solution.

TRADE
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Trade—It has been clearly established that the climate and physical conditions of many parts of India are in every way suitable for the growth of *Coca*; but whether it will pay to cultivate the plant is another question.

According to Squibb in the *Ephemeris* May 1887 the Peruvian Government records and taxes a production of 15,000,000 lb per annum and the Bolivian Government 7,500,000 lb. Of the latter quantity 5% or 375,000 lb is exported to the United States and Europe. Assuming that from the doubly great produce of Peru twice the quantity above mentioned reaches the United States and Europe an aggregate export of 1,125,000 lb annually is arrived at. This amount of leaf if manufactured would yield from 2,000 to 3,000 lb of cocaine. When it is remembered that the uses of *Coca* are very limited in Europe that it is employed almost entirely as a medicine and that there are no indications of *Coca* preparations coming into general use as a beverage it seems very improbable that cultivation of the plant to any great extent would pay. Still the Indian plant seems to be peculiarly rich in the alkaloid and small quantities carefully prepared and packed would probably find a ready sale in Europe.

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The Bastard Sandal. (F Murray) **ERYTHROXYLON monogynum**

Recent returns give the price of the dried leaf at from 10d to 1s 6d a pound

Erythroxylon monogynum, Roxb Fl Br Ind, I 414, Beddome, BASTARD SANDAL OR RED CEDAR. [Fl Sylv, I 81]

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Syn.—*E. indicum* Beddome *SETIHA INDICA DC*

Vern.—*Divaddaram* or *déavadáris* (in Arcot, Salem and Coimbatore) *Nátá-deodár simpliciss* or *simpulicham* (in Madras South Arcot Trichinopoly &c) *sammanathi* (in Madras Tanjore Madura and Tinnevely) *Kat santhanam* (in Salem) *thasadaram* (in Madras) **TAM**; *Bénide Nilghiris* *Huli* **BADAGA** *Kuruvakumara*, **KAN** *Divaddru* (the name in most Telugu speaking districts) *adavigóránta* (in Anantapur) *gathiri* (Cuddapah) **TEL**

References.—*Roxb Fl Ind Ed C B C 386, Vingt Hort Sub Cal 172 Kurr Fo Fl Burm I 171 Gamble Man Timb 58 Thwaites En Ceylon Pl, 53 Moodeen Sheriff Mat Med Madras 70, Pharmacog Ind, 242 Dymock Mat Med W Ind, 802 Drury U Pl 391 Lisboa U Fl Bomb, 195 Cooke Gums and Gum-resins 120; Spens Encyclop 1684 Balfour, Cyclop 1055 Kew Off Guide to the Mus of Ec Bot, 22 Paxton Bot Dic 516 (under Sethia) Mysore and Coorg Gas II 87 Official Correspondence (Proceedings Board of Revenue) Madras No 165 1889 Special Report by J Cameron Esq Bangalore*

Habitat.—A shrub or small tree of the hilly tracts of the Western Peninsula also met with in the Kurnool Bellary Cuddapah Nellore Chingleput and North Arcot Districts of South India. It occurs plentifully in Tanjore Tinnevely (ascending the Gháts to an elevation of 2500 feet) throughout the Sigur range and in the forest reserves of the Nilghiri hills In Ceylon it is said to be found in the hot dry parts of the Island

In a recent official report regarding this plant as a source of Madras fodder it is stated that the belief prevails that the plant is well able to withstand drought, and evidently flourishes on the driest soils in the very hottest climates

Oil.—The wood is reported to yield an oil used as a preservative for native boats. This oily substance resembling tar is known in Ceylon under the name of *dummale* it is extracted by packing pieces of the wood in an earthen pot inverted over a similar empty one and surrounded by fire The tar thus distilled is soluble in ether alcohol and turpentine and is an excellent preservative of timber It is not a commercial article but might become so This information was first published by Mr W C Oudnatje and his account of its preparation and uses has been reproduced in various works such as *Cooke's Gums and Resins*; *Spens Encyclop &c* without anything new being added to our knowledge of the substance

Medicine.—Dr Bidie says that during the Madras famine of 1877 the LEAVES were largely eaten by the starving poor and as there is nothing in them structurally likely to satisfy the pangs of hunger it seems probable that they contain some principle like that of *E. Coca* Specimens analysed by the Government Quinologist at Madras were found however to have no anæsthetic property analogous to that met with in *E. Coca* but to possess a bitter and tonic principle, which might mitigate the pangs of hunger This same result was obtained by Dr L. A Waddell, in his chemical examination of a large quantity of the leaves of this plant furnished by Dr King Superintendent, Royal Botanic Gardens, Calcutta (see *Indian Medical Gazette for September 1884 p 281*) Dr Waddell found that it contained no alkaloid whatsoever and he accordingly arrived at the conclusion that had any such alkaloid as that met with in *E. Coca* existed in this species the famine-stricken people of Madras would not have continued to eat the leaves Dr Moodeen Sheriff describes the plant as possessing stomachic diaphoretic, and stimulant-diuretic properties, the

OIL
Wood.
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MEDICINE,
Leaves.
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EUCALYPTUS

Eucalyptus—Gum Trees

MEDICINE

Wood

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Bark

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Liniment

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FOOD

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Fruit

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Famine

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FODDER

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wood being sold in Madras and used in slight cases of dyspepsia and continued fever and also in some cases of dropsy. He says the wood has a strong aromatic and agreeable smell. Dr Bidie mentions the powder as used medicinally as a substitute for sandal wood. The BARK is said by Dr Shortt to be employed as a tonic in fever being prepared as an infusion. The leaves when eaten as a vegetable are believed to possess refrigerant properties and the pulp beaten into a LINIMENT with gingelly oil is used as an external application to the head (*Madras Agr. Hort. Soc. Journal IV 41*). This statement regarding the preparation of a liniment was apparently first made by Ainslie (*Mat. Med. II 421*) regarding the plant he calls *E. areolatum Willd.*

Food—Both in the various Madras accounts of this plant and in Mr Lisboa's *Useful Plants of Bombay* the LEAVES are said to be regularly eaten as a green vegetable. Of Madras it is reported that they are used in curries and that in famine times they are boiled with rice *ragi* &c to increase the volume of food. Mr Lodge (*District Forest Officer Cuddapah*) writes that the plant yields a small red juicy FRUIT with a refreshing taste and a flavour somewhat resembling that of a cherry.

Fodder—The Government of Madras recently called for information as to the extent the LEAVES of this plant were used as fodder. The replies showed that they were sometimes but rarely used in the Godavari Cuddapah and Anantapur districts. The Collector of Salem however reported that no one recognises it as a fodder plant and that cattle have been seen to pass close to young succulent coppice shoots without touching them. The Madras report concludes however by saying that else where when other supplies fail cattle, sheep and goats eat the plant.

Structure of the Wood—Sapwood white, heartwood dark brown with a pleasant resinous smell, it is very hard, takes a beautiful polish and is sometimes used as a substitute for sandalwood (*Santalum album*).

Esparto Grass See *Lygeum Spartum* and *Stipa tenacissima*.

(*cf. F. Duthie*)

EUCALYPTUS, L. Her. Gen. Pl. I 707

The majority of the species of which about 140 have been described are confined to Australia and Tasmania where they afford characteristic features in the scenery of those countries. A few occur in New Zealand and in some of the islands of the Indian Archipelago.

Popularly known under the general name of gum trees, they are locally distinguished in Australia by characters observable in the bark, which in some of the species is fibrous or stringy, in others hard and fissured, whilst sometimes it presents a smooth and polished surface and occasionally it scales off in flakes. The botanical determination of the species is often difficult owing to the close similarity of their floral structure as well as to the various forms sometimes assumed by the foliage on different portions of the same tree and at different periods of its life. This task has however been greatly lessened by the researches of the eminent local botanist Baron von Mueller brought to light in his very valuable illustrated monograph entitled *Eucalyptographia*.

As trees they are chiefly remarkable for their rapid growth and the enormous height to which some of the kinds attain; one specimen in Victoria, a fallen one having been found to measure 480 feet in length and specimens of *E. obliqua* (the String bark) have been felled in Tasmania the trunks of which measured 300 feet high and 100 feet in circumference.

The timber yielded by some kinds, notably that of *E. Globulus* (Blue gum), *E. marginata* (Jarrah or Mahogany of South-West Australia) and

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Eucalyptus—Gum Trees. (F F Duthie) EUCALYPTUS.

E. robusta (Red gum of South Australia) is extremely valuable on account of its strength and durability under water, and its immunity from attacks by white-ants

An astringent substance resembling *kino* (a product of *Pterocarpus Marsupium*) is yielded by several of the species and is used medicinally, as well as for tanning and dyeing

A still more important product is Eucalyptus oil which through the exertions of Mr J Bosisto of Melbourne, has recently been extensively brought into commerce and is now being employed for various purposes. The existence of this oil which can be distilled in greater or less quantities from the different species of *Eucalyptus* has no doubt some influence in improving the climate of districts where malarious fever prevails, though the beneficial results are in all probability mainly due to thorough drainage of the soil effected by the rapid growth of these trees. The following list taken from Mueller's 'Select Extra-Tropical Plants' p 146 gives the percentage of oil yielded by certain species:—

E amygdalina	3 313	per cent of volatile oil
E oleosa	1 250	,
E Leucoxylo	1 060	per cent of volatile oil
E gonicalyx	0 914	,
E Globulus	0 719	
E obliqua	0 500	

Baron von Mueller then goes on to explain that the lesser quantity of oil of **E Globulus** is compensated for by the vigour of its growth and the early copiousness of its foliage and that the proportion of oil varies somewhat according to locality and season. '**E rostrata**, he says, though one of the poorest in oil is nevertheless important for malaria regions as it will grow well on periodically inundated places and even in stagnant waters not saline

Though confined to the Australian continent and its neighbourhood the various species of *Eucalyptus* are found to thrive under very different influences as regards climate and soil. Some occur at elevations where snow remains on the ground for several months of the year others flourish best in the northern and warmer parts of the continent others again are more at home in swampy ground whilst some seem to prefer sandy or calcareous soils. The experimental cultivation of gum trees in other countries must therefore be regulated by a consideration of these facts. As regards *Eucalyptus* cultivation in India the most successful results have been obtained on the Nilghiris where according to the latest report received from the Conservator of Forests South Circle Madras it is stated that 'there are several extensive plantations both Government and private, and several species but chiefly **E Globulus** are cultivated on most of the hills in Southern India at from 4 000 to 8 000 feet. It is quite impossible to estimate the area. In Wynaad too several varieties have been introduced from Queensland and are growing vigorously. Some trees planted in 1884 are now over 60 feet high and 42 inches girth at 4 feet from the ground. The species to which these Wynaad trees belong have yet to be determined. Eucalyptus oil is extracted in a small way on the Nilghiris.'

In Northern India extensive trials were made in 1876 with seeds of various kinds of *Eucalyptus* and it was then ascertained that of these **E resinifera**, *Smith* and **E rostrata**, *Schlecht* were the most promising for cultivation in the plains. These two species have since maintained their character and there are now several vigorous specimens both at Saharanpur and Lucknow which yield seed abundantly. The localities in Northern India best suited for the blue gum (**E Globulus**) are

HISTORY.

**EUCALYPTUS
Globulus****The Blue Gum Tree.****HISTORY**

Rámikhet and Abbottabad *E. citriodora*, Hook and *E. melliodora*, A Cunn both having deliciously scented foliage are thriving well in many places in the plains of North India

The following communication was received from the Conservator of Forests Panjáb in August 1889 — A considerable number of different species of *Eucalyptus* have been tried in various parts of the Province but on the whole the results have not been satisfactory it has been found however that planting in groves gives a better chance of success than when the trees are grown singly along roads &c In Kangra in the Koth ala estate and in Kulu a few specimens of the blue gum and other unknown kinds have done well and experiments are now being made in the Dera Tahsil

The species has been introduced into Bashahr but has not yet established itself; but in Hazara the experiments have been successful and there are now a number of trees round Abbottabad 80 feet high In Chamba attempts were made at Kalatop, Chamba and Bakloh at the two former places they failed but there are about 100 trees flourishing at Bakloh The most extensive experiments that have been made were in the Lahore District at Changa Manga and in the carob plantation at Lahore In all twenty five species have been tried but out of these only three *E. rostrata*, *E. citrioides*, and *E. resinifera* have had any real success

The cause of this failure may be mainly attributed to three sources 1st failure in the rains 2nd injury to the young stems by suburn 3rd, the worst of all the white ants which attacked the tree by eating away the supporting roots From these causes but mainly from the last only some 300 *Eucalypti* have succeeded in Changa Manga out of the several lakhs that have been planted out

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Eucalyptus Globulus, Labill MYRTACEÆ**BLUE GUM TREE OF VICTORIA AND TASMANIA**

Vern — *Kurpura maram* MADRAS

References — *Brandis For Fl* 231 *Gamble Man Timb* 188; *Flück & Hanb Pharmacog* 280 *U S Dispens* 15th Ed 565 *Bent & Trim Med Pl* 109 *Year Book Pharm* 1874 25 113 221 1875 5; *Christy Comm Pl* V 45 *Drury U Pl* 199 *Kew Reports* 1877 29; 1879 16; 1881 12 1882 20; *Kew Off Guide to the Mus of Ec Bot* 65; *Kew Off Guide to Bot Gardens and Arboretum* 116 117; *Journ Agri Hort Soc* 1885 Vol VII pt iii *Procs xcvi Ind For* 1885, Vol XI No 2 51 *Journ Agri Hort Soc* 1875 78 Vol V 1 *Madras Man of the Administration II* 110 *Mueller Select Extra Trop Pl* 150 *Report Horticultural Gardens Lucknow* 1888-89 7

Habitat — A lofty tree gregarious in Victoria and the south of Tasmania Its introduction into India has met with complete success on the Nilghiris where the plantations which were started in 1863 are well established It has also been successfully cultivated at Abbottabad and Rámikhet It does not thrive in the plains nor on the outer Himálayan ranges

Cultivation — The seeds of the Blue gum are unusually large for the genus they germinate freely and the seedlings at once begin to shoot up with marvellous rapidity Great care however is required in transplanting them

Gum — The BARK of this tree exudes an astringent gum resembling both in appearance and properties that which under the name of *kino* is yielded by *Pterocarpus Marsupium*. It is known in trade as Australian, 'Botany Bay' or *Eucalyptus kino* A kino of better quality is obtainable from other species of *Eucalyptus*, such as *E. rostrata*, *E. corymbosa*, and *E. citriodora*, and according to the authors of the *Pharmacographia*, might with no disadvantage be substituted for that of true kino

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**CULTIVA
TION
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**GUM
Bark
384**

The Blue Gum Tree.

(7 F Duthie)

EUCALYPTUS
Globulus.

Tan and Dye—The gum above mentioned is used for tanning and dyeing

Fibre.—The BARK of this tree yields a material which has been found suitable for making paper

Oil—The LEAVES and young SHOOTs yield an essential oil used in the preparation of the much advertised Eucalyptus Soap It is also said to be employed as a substitute for Capeput Oil The chemical properties of Eucalyptus oil as determined by M Oloez are reviewed in the *United States Dispensatory* as follows: Of this oil the fresh leaves afforded 275 parts per hundred the recently dried parts 6 parts M Oloez believes the oil to be composed of two camphors differing in their volatility The bulk of the oil yielded is the portion first distilled to this Oloez has given the name of *Eucalyptol* To obtain it pure a redistillation from caustic potash or chloride of calcium is necessary It is very liquid nearly colourless with a strong aromatic camphoraceous odour polarises to the right is slightly soluble in water, but very soluble in alcohol and has the formula $C_{12}H_{20}O$ Nitric acid produces with it a crystallizable acid by the action of phosphoric acid it is converted into *eucalyptene* a substance allied to *cymene* and *eucalyptolene* (15th Ed 566)

Medicine—The leaves yield an essential OIL used in medicine, and sometimes as a substitute for Capeput oil

Eucalyptus was originally recommended as a remedy in intermittent fever but experience has failed to establish its value as an antiperiodic Whatever medical virtues it possesses beyond astringency reside in the volatile oil This when applied locally acts as a powerful irritant As a stimulating narcotic the oil of Eucalyptus has been used with asserted success in migraine and other forms of neuralgia As an antispasmodic it has been highly lauded in asthma In chronic or subacute bronchitis it may often be employed with advantage especially when there is a tendency to spasm (*U S Dispens 566*)

SPECIAL OPINIONS—I have used 3ss doses of the leaves infused in an inhaler in cases of chronic thickening of the mucus membrane of fauces and throat with marked good results one case of over 3 years' standing quite recovered under its use (*Honorary Surgeon Easton Alfred Morris in Medical charge Tranquibar*) Prof Lister has lately made use of the oil as an antiseptic dressing in place of carbolic acid It is used undiluted It is largely employed in the form of ointment and as antiseptic gauze The oil with hot water as an inhalation has been used with the best effects in diphtheria in America (*E G Russell Superintendent Asylums at Presidency General Hospital Calcutta*) Dose of the oil from 10 to 30 minims for true leprosy with good effect (*Apothecary Thomas Wurd Madanapalli Cuddapah*) A powerful antiseptic and used by Prof Lister in preparation of antiseptic gauze (*S Westcott A M D*) Much used in antiseptic surgery as a dressing Also in diphtheria in the form of blue-gum stem—*vide Gibbs* in the *Lancet* February 24th and March 31st 1883 The tincture is much lauded by some for ague (*G B*) The inhalation of the essential oil is useful in bronchial and phthisical cases The oil can be supplied from the Nilghiri plantations (*Surgeon General William Robert Cornish F R C S C I E Madras*) Used as an antiseptic (*Brigade Surgeon G A Watson Allahabad*) Also employed in intermittent fever on account of its antiperiodic properties (*Civil Surgeon J Anderson M B Bijnor*) An infusion of the leaves, or ten to twenty drops of the oil in a pint of boiling water excellent for steaming the throat when ulcerated" (*Surgeon Major W Farquhar M D, I M D, Ootacamund*)

TAN AND
DYE.
385
FIBRE
Bark
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OIL
Leaves.
387
Shoots.
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MEDICINE.
oil
389

EUGENIA.

The Blue Gum Tree, Teosinte Grass

FOOD
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TIMBER
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INDUSTRY
392

Food —A liquor is made from *Eucalyptus* that has attained some reputation in Australia

Structure of the Wood —Strong tough and durable and extensively used in Australia for ship building house building sleepers telegraph poles &c It has been found by experiments to rival in strength the best English oak

INDUSTRIAL USE

In a recently published report on the Lucknow Horticultural Gardens, it is mentioned that a new demand for the leaves of the tree has arisen owing to the discovery having been made that a decoction has the power of removing the scale or incrustation which forms in locomotive boilers as a deposit from the water

The matter is now engaging the attention of the Locomotive Department of the Bengal and North Western Railway at Gorakhpur and it is reported that the trials there made have had good results

The following extract from a letter regarding the method of use is published We have a large tank which we fill with leaves and small branches the water is then put in and boiled or made warm with waste steam This continues till the fluid has a dark colour when it is used say two or three gallons of the decoction is put into the tender and so mixes with the water or enters the boiler with the feed

I learn excellent results are being obtained as the scale tumbles off the plates when the boilers are being washed out

EUCHLÆNA, Schrad Gen Pl III 1114

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Euchlæna luxurians, Ascheron *Dulhe Fodder Grasses N Ind*

TEOSINTA Fr

[19 GRAMINEÆ

Syn —*REANA LUXURIANS*

References —Christy *Comm Pl* III 5 Smith *Dic* 400 *Kew Reports* 1879 17 1880 80 *Journ Agri Hort Soc* 1885 Vol VII pt 3 *New Series Procs Soc CVII Ind For X III 111 Journ Agri Hort Soc VI 117 Müller *Select Extra Trop Pl* 165*

Habitat —A native of Guatemala It is a quick growing succulent grass resembling maize It requires 9 or 10 months from sowing to the ripening of its seed and within that period single cultivated specimens have been known under generous treatment to produce as many as 90 stems and to attain 18 feet in height It is a prolific seed bearer Dr Schweinfurth is reported to have secured from three seeds about 12 000 grains

FODDER
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Fodder —The grass is described as a most excellent fodder for cattle The attempts hitherto made to introduce it into India have not had any definite results for while in some places it has been favourably reported on in others it has failed and the general opinion is that it could never compete with the existing fodder plants of India such as *juar* &c as its cultivation on a large scale would be too expensive owing to its requiring rich soil and constant irrigation

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EUGENIA, Linn Gen Pl I 718

A large genus containing over 700 species of which about one fifth are represented in British India They consist of trees or shrubs with evergreen smooth foliage and many of them are very handsome when in flower They are found most abundantly in the humid regions of North East and South India also in Burma Malaya and Ceylon A few only of the Indian species are of economic importance The three sections, *Jambosa* *Syzygium* and *Eugenia*, have by many writers been treated as separate genera In *Syzygium* the petals are combined and usually fall off in one piece; many of the species are fine large timber trees In *Jambosa* and *Eugenia* the petals are free and spread

E 395

The Eugénias.

(F F Duthie)

EUGENIA
claviflora

ing Linnaeus is said to have named the genus after Prince Eugene of Savoy

Eugenia alba, Roxb MYRTACEÆ see **E javanica**.

E aquea, Burm Fl Br Ind II, 473 Wight Ic II 216, 550

Syn.—**JAMBOSA AQUA DC**

Vern.—**Jambo BENG Wat jambu SING**

References.—**Roxb Fl Ind Ed C B C 400 Voigt Hort Sub Cal 47 Kurs For Fl Burm I 404 Gamble Man Timb 193; Thwaites En Ceylon Pl 115 Trimen Hort Zeyl 32 Rumph Herb Amb I 126 Balfour Cyclop II 411**

Habitat—A medium sized tree with large white flowers. It is a native of the Moluccas and is wild also in Ceylon. It has been planted extensively in Bengal and Burma.

Food—The fruit which is of about the size of a loquat and flattened at the end is either pale rose-coloured or white. The former has an aromatic taste the latter is the *jambo ayer* of Rumphius.

E Arnottiana, Wight Fl Br Ind, II 463 Wight Ic, I 999

Vern.—**Nawal S INDIA**

References.—**Beddome For Man 107 Ind For X 552**

Habitat—A large spreading tree common in the moist woods on the Nilghiri Pulney and Anamallay hills of South India.

Food—Fruit dark purple. **Beddome** says that it is eaten but is very astringent.

Structure of the Wood—The timber is said to be valuable.

E calophyllifolia, Wight Fl Br Ind II 494 Wight Ic I 1000

References.—**Beddome For Man 107 Thwaites Enim Ceylon Pl 118 Ind For X 552**

Habitat—A large and beautiful tree found on the Nilghiri range and on Adam's Peak in Ceylon.

Food—The purple oblong fruit is edible.

Structure of the Wood—Its timber is valuable and used for building and other purposes (**Beddome**).

E caryophyllæa, Wight Fl Br Ind II 490 Wight Ic I 540

Syn.—**SVYZGIUM CARYOPHYLLÆUM Garlin**

Vern.—**Jaman HIND Chotajam SANTAI Dan dang SING**

References.—**Thwaites En Ceylon Pl 117 Dals & Cils Bomb Fl 93 Trimen Hort Zeyl 33 Rheede Hort Mal V t 27 Lisboa U Pl Bomb 78 156 339 Bomb Gas XV 434**

Habitat—A small tree found in the Western Ghâts South India and in Ceylon.

Gum—The tree is said to yield a gum somewhat resembling *kino*.

Food—The round black pea sized berries are eaten in the Bombay Presidency and also by the Singhalese.

E caryophyllata, Thunb see **Caryophyllus aromaticus, Vol II 202**.

E caryophyllifolia, Lam a variety of **E Jambolana**.

E cerasiflora, Kurs see **E Kurzu**.

E cerasoides, Roxb see **E operculata**.

E claviflora, Roxb Fl Br Ind II 484 Wight Ic, I 606

Syn.—**SVYZGIUM CLAVIFLORUM Wall**

Vern.—**Lumba nuli jamb CHITTAGONG**

References.—**Roxb Fl Ind Ed C B C., 399; Voigt Hort Sub Cal, 48 Kurs For Fl Burm I 480**

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FOOD
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FOOD
300
TIMBER,
400
401FOOD
402
TIMBER,
403
404GUM,
405
FOOD
406

407

**EUGENIA
Jambolana****The Black Plum.****FOOD
408**

Habitat—A large tree found on mountains in Sikkim and Khasia altitude 2 000 to 4 000 feet also in Sylhet Chittagong Pegu Nicobar and Andaman Islands Tenasserim Singapore and Penang

Food—The fruit which ripens in May is eaten by the natives

Eugenia cymosa, Roxb see **E grandis**.

409

E formosa, Wall Fl Br Ind II 471 Wight Ic, t 611

Syn—**E TERNIFOLIA Roxb**

Vern—**Bolsobak panchidung GARO; Phul jamb ldlphul-jamb (Roxb) CHITTAGONG Barajaman NEPAL Famsikh LEFCHA Bunkonhrs MICH**

References—**Roxb Fl Ind Ed C B C 399; Voigt Hort Sub Cal 48 Kurs For Fl Burm I 492 Gamble Man Timb 193 Balfour Cyclop 1059**

Habitat—A handsome moderate-sized tree with very large leaves met with near streams on the Eastern Himalaya and in Burma There are two forms one with white and the other with red flowers

Food—The fruit of about the size of a walnut is eaten by the natives

Structure of the Wood—Heavy uniformly brown close grained takes a fine polish (**Kurs**)

**FOOD
Fruit****410
TIMBER.****411****412**

E grandis, Wight Fl Br Ind II 475 Wight Ic t 614

Syn—**E CYMOSA Roxb**

Vern—**Zebri MAGH, Jam BENG Battijamb SYLHET Taung thabye thabyegyi BURM**

References—**Roxb Fl Ind Ed C B C 400 Voigt Hort Sub Cal 49 Kurs For Fl Burm I 489 For Man 1071 Gamble Man Timb 193 Thwaites En Ceylon Pl 116 & 417 Trimen Hort Zeyl 33**

Habitat—An evergreen tree of Eastern Bengal Burma and the Andaman Islands

Structure of the Wood—Red rough and hard (**Gamble**) 'The wood is used for various economical purposes' (**Roxburgh**)

**TIMBER
413****414**

E hemispherica, Wight Fl Br Ind II 477 Wight Ic t 525

References—**For Man 203 Thwaites En Ceylon Pl 116 Trimen Hort Zeyl 33 Balfour Cyclop 1059**

Habitat—A large handsome tree common in mountain forests in Southern India and in Ceylon

Structure of the Wood—The timber is said to be useful for various purposes

**TIMBER
415****416**

E Heyneana, Wall Fl Br Ind II 500 Wight Ic 539

Syn—**E SALICIFOLIA Wight SYZYGIUM SALICIFOLIUM Grah**

Vern—**Gara kuda KOL Gara kud SANTAL Jamti KHARWAR; Hend, GOND Gambu KURKU Yambu jamun, C P Panjam bul MAR**

References—**Brandis For Fl 234 Grah Cat Bomb Pl 73 Ellisot Fl Andhr, 40 Gamble, Man Timb 195 Dals & Gids Bomb Pl 94 For Man 109 Lisboa U Pl Bomb 339 Balfour Cyclop II 411 For Adm Report Ch Nagpur 1885 31**

Habitat—A shrub or small tree found in the Bombay Ghats and in the beds of rivers in Berar and the Central Provinces

Food—The fruit is eaten by the natives in the Central Provinces

Structure of the Wood—Similar to that of **E Jambolana**, but pores smaller (**Gamble**)

FOOD**417
TIMBER****418****419**

E Jambolana, Lam Fl Br Ind, II, 499 Wight, Ic t 535

BLACK PLUM Eng

Syn—**SYZYGIUM JAMBOLANUM, DC**

E 419

The Black Plum.

(J F Duthie)

EUGENIA
Jambolana.

Vern.—*Jáman*, *jam jamun*, *phalinda phalanda*, *jamni phaláni pharanda phavanda*, *paíman* HIND; *Jám kála jám* BENG *Zebri chaku kau* MAGH *Kuda Kól*; *Kudu, kud* (so-kod, *chuduk-bad* Rev A Campbell), *SANTAL*; *Jamo jámbuli* URIYA; *Jamu ASSAM*; *Chambu GARO*; *Phoderkúng* LEPCHA *Kor jam* MICHÍ, *Jam MAL* (S P); *Náindi GOND* *Jambun ORAON*; *Jamun RAJ* *Jamun jamin jamul* C P; *Jambul jámbu jámbhul jámbudo* BOMB; *Jambul MAR*; *Jambu jámbura, jámbudi* GUZ; *Nával narval nawal nawar, naga TAM*, *Nerale* MYSORE *Naredu, rácha neredu, podda neredu* (large fruited var) *náiruri náreyr nasodu nasedu* TEL; *Narala nerlu, nerale KAN*; *Thabyebyu, BURM Mahadan madan naval mudang* SING *Jambu jámbula SANS*

References.—Roxb *Fl Ind Ed* C B C 398 Voigt *Hort Sub Cal* 49 Brandis *For Fl* 233 Kuhn *For Fl* Burm I 485 Gamble, *Man Timb* 194 Dals & Gibs *Bomb Fl* 93 Aitchison *Cat Pb* and *Sind Pl*, 60 Elliot *Fl Andhr* 72 133 162 Rheede *Hort Mal* 5 t 29 U C Dutt *Mat Med Hind* 164 Dymock *Mat Med W Ind* 333 S Arjun *Bomb Drugs* 57 *Ind Agri*, (Oct 9th 1886) p 497 Atkinson, *Econ Prod N W Prov* 74 *Him Dist* 736 Drury *U Pl* 409 Lisboa *U Pl Bomb* 77 156 211, 245 259 279 284 291, Christy *Com Pl and Drugs* No 8 p 77, and No 10 p 63 Cooke *Gums and Gum resins*, 11 39 Atkinson *Gums and Gum resins* 12 McCann *Dyes and Tans Beng* 49 135 144 159 160 168 Baron F Muell *Sol Extra Trop Pl* 167 Balfour *Cyclop* 1059 Smith *Dic* 227 *Home Dept Cor* 238 *Journ As Soc* 1867 80 *Bomb Gas XIII*, 1 24 XV, 68 Mason *Burma and Its People* p 45 *Special Report of Collector of Madura Ind Agri* Oct 9th 1886 p 497

Habitat.—A moderate sized tree found wild or cultivated over the greater part of India from the Indus eastward and to the extreme south of the Madras Presidency. It ascends to 3 000 feet on the Panjáb Hima laya and to 5 000 feet n Kumáon

Gum.—Yields a gum somewhat resembling *kino*

Dye and Tan—The BARK is used for dyeing and tanning. In Assam it is employed along with the red *Munji* dye to impart brilliancy to the colour it is also used to colour fishing nets. It is mentioned as one of the ingredients (in Lohárdaga Chutia Nagpur) in a preparation of a permanent black (McCann). In tanning it is often combined with *Gardn bark* (*Cerriops Roxburghiana* Vol II, 261). [A decoction of the bark is very generally employed to precipitate indigo from the infusion obtained from the plant. See *Indigo Ed*]

Medicine—The BARK is astringent and used in cases of dysentery and the decoction as a tooth gargle. A vinegar prepared from the juice of the unripe fruit, is an agreeable stomachic and carminative. It is also used as a diuretic. The fresh juice of the bark is given with goat's milk in the diarrhoea of children. The expressed juice of the leaves is used alone or in combination with other astringents in dysentery (U C Dutt). The powdered SEEDS have had the reputation in recent years of being useful in the treatment of diabetes.

SPECIAL OPINIONS—The powder of the dried stone of the fruit is used in cases of diabetes. It certainly does diminish the quantity of sugar in the urine very quickly and in some cases even permanently (Surgeon D N Parakh *Indian Medical Department Bombay*). The dried seeds in combination with those of *Mangifera indica*, are administered with very good effect in the form of powder in cases of diarrhoea and dysentery (Sakharam Arjun Rawat *L M Bombay*). "Decoction of the bark used as an astringent gargle in sore-throat and juice of the fresh tender leaves is given with goat's milk in cases of dysentery (Bolly Chund Sen *Teacher of Medicine Campbell Medical School Sealdah Calcutta*). A decoction of the bark is used largely for diarrhoea and dysentery in combination with carminatives such as cardamoms and cinnamon (Dr Bensley *Civil*

GUM
420
DYE and TAN
Bark
421

MEDICINE.
Bark
422
Juice
423

Seeds.
424

EUGENIA
Jambolana**The Black Plum****MEDICINE**

Surgeon Rajshahye) 160 grains of the pulverized seed is taken as an antidote in cases of Nux vomica poisoning" (*Surgeon W F Thomas Madras Army Mangalore*) Used in diabetes and in enlargement of spleen Dose of extracted juice about 4 drachms (*Civil Surgeon John McConaghey M D Shahjahanpore*) The syrup of the fruits is used in diarrhoea, (*Civil Surgeon R Gray Lahore*) The decoction of the bark is used as a gargle in salivation whether brought on by prolonged use of mercury or other causes (*Civil Surgeon Bankibehari Gupta Poor e*) The ripe fruit is considered curative for calculous affections The leaves are used as a poultice for scorpion bite' (*Surgeon Major Robb Civil Surgeon Ahmedabad*) The vinegar manufactured from the ripe fruit is much used as a stomachic by the natives and is useful in cases of enlargement of the spleen The doses used are one to two drachms The fruit is useful in diarrhoea (*Varan Misser Kolhe Basar Dispensary Hasaribagh*) The vinegar of ripe fruit is cooling and used in indigestion The juice of fresh leaves is used in spongy and painful gums (*Shub Chundra Bhattachary, Chanda Central Provinces*) Grows very commonly and is extensively used as an astringent in Mysore (*Surgeon Major John North Bangalore*)

FOOD
425

Food—The fruit which is sometimes as large as a pigeon's egg and of a purple colour is eaten by all classes of people it is sub-acid and rather astringent and is improved in taste by being pricked and rubbed with a little salt and allowed to stand an hour In Goa a wine faintly resembling port is prepared from the ripe fruit

A sort of spirituous liquor called *Jambava* is described in recent Sanskrit works as prepared by distillation from the juice of the ripe fruits (*U C Dutt Mat Med Hind 164*) The Collector of Madura reports that the fruit should not be extensively eaten as it is apt to bring on fever *Paludanus* in a note appended to *Van Linschoten's Voyage* says—

This fruit is little used by Physicians but is much kept in pickle eaten with Sodden Ryce for they procure an appetite to meat

TIMBER
426

Structure of the Wood—Reddish grey rough moderately hard darker near the centre no distinct heartwood It is fairly durable Five sleepers of it were laid down in 1870 on the Oudh and Rohilkhand Railway and taken up in 1875 when they were reported to be fairly sound and not touched by white-ants It is used for building agricultural implements and carts also for well work as it resists the action of water

DOMESTIC
and SACRED
427

Domestic and Sacred Uses—It is often planted as a shelter tree for groves and as such is known under the name of *jamoia* in the Saharanpur and Karnal districts In habit it is very different from the type and should perhaps be considered as a distinct variety

The god *Megh* is said to have been transformed into a jambul tree The colour of the fruit being dark like that of Krishna this plant is very dear to him; it is therefore worshipped and Brahmins are fed under it The leaves are used as platters or *panch pallows* and for pouring libations (*Lisboa U Pl Bomb 284*)

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Var caryophyllifolia Fl Br Ind II 490 Wight Ic t 553

Syn.—F CARYOPHYLLIFOLIA Lam SYZYGIUM CARYOPHYLLIFOLIUM DC S LATERIFLORUM Royle

Vern.—Chota jamb BENG; Jamun KOL; Bir-kod SANTAL; Bata jania TEL; Nairia KAN

References—Roxb Fl Ind Ed C B C 308 Vout Hort Sub Cal 40 Brandis For Fl 234 Thwaites En Ceylon Pl 417 Drury U Pl 416 Lisboa U Pl Bomb 77 Cooke Gums and Gum resins 11 Gums and Resinous Prod of Ind (P W D 1871) 68; Balfour Cyclop I 1059

Habitat—Found in most parts of India Its lanceolate acuminate leaves, and small pea shaped fruit, distinguish it from the type.

E. 428

The Rose Apple.	(7 F Duthie)	EUGENIA Jambos.
<p>Gum — Yields a very good gum grows in the Mysore district." (<i>Gums and Resinous Prod of India P W D 1871</i>)</p> <p>Medicine — The Rev A Campbell states that in Chutia Nagpur the LEAVES are used medicinally</p> <p>Structure of the Wood. — Whitish very strong close grained hard and durable (Roxb)</p>		<p>GUM. 420 MEDICINE Leaves 430 TIMBER. 431 432</p>
<p>Eugenia Jambos, Linn ; Fl Br Ind, II, 474 Wright, Ic 435</p> <p>ROSE APPLE</p>		
<p>Syn. — JAMBOSA VULGARIS DC</p>		
<p>Vern. — Gulab-jāman HIND Gulāb-jamb BENG ; Goldpām URIVA ; Jambu SIND Jāmb DECCAN ; Malle nerale pan nerale COORG ; Pannerali KAN Jambu SING ; Jamba (Roxb) jambu SANS Toffah ARAB</p>		
<p>References — Roxb Fl Ind Fd C B C 401 Voigt Hort Sub Cal 47 Brandis For Fl 233 Kurz Fr Fl Burm I 495 Gamble Man Timb 193 DC Origin Cult Pl 24 Trimen Hort Zeyl 3; Rheis Hort Mal I 27 f 17 Atkin n Econ Prod N W Prov 74; Dru y U Fl 265 Lisboa U I L Bomb 156 Smith Dic 355 Mason Burma 450 Gas Bomb XVIII Pt I 46</p>		
<p>Habitat. — A small handsome tree a native of the East Indies Largely cultivated in India and in other tropical countries Kurz says that it is frequently cultivated in native gardens all over Burma The beauty of its flowers fruit and foliage renders it a fit ornament in any garden</p>		<p>DESCRIPTION 433</p>
<p>History — Linschoten in his <i>Voyage to the East Indies</i> (1598) gives the following description of this tree and its fruit — The trees whereon the Jambos do grow are as great as Plum trees and verie like unto them it is an excellent and a (verie) pleasant fruite to looke on as big as an apple it hath a red colour and somewhat whitish so cleare and pure that it seemeth to be painted or made of waxe it is very pleasant to eate and smelleth like rose water it is white within and in eating moyst and waterish it is a most daintie fruite as well for bewtie to the sight so for the sweet savour and taste it is a fruite that is never forbidden to any sicke person as other fruites are but are freele given unto sicke men to eate that have a desire thereunto for it can doe no hurt The blossoms are likewise very faire to the sight and have a sweet smell they are red and somewhat whitish (of colour) This tree beareth fruite three or foure tymes every yeare and which is (more) wonderfull it hath commonly on the one side or halfe of the tree ripe Jambos and the leaves fallen off and on the other side or halfe it hath all the leaves and beginneth (again) to blossome and when that side hath fruite and that the leaves fall off, then the other side beginneth again to have leaves and to blossome and so it continueth all the yeare long within they have a stone as great (and very neere of the same fashion) as the fruite of the cypres tree"</p>		<p>HISTORY 434</p>
<p>The note by Paludanus appended to Linschoten's account of the Rose-apple tree probably refers to <i>E. malaccensis</i> Linn as suggested by Col Sir H Yule In a foot note to the English edition (1885) of <i>Linschoten's Voyage to the East Indies</i> Yule says — The name of the tree and fruit jambu jambu is Sanskrit one of the ancient names of India e.g. in the oldest writings of the Buddhists and in inscriptions from the third century B C was <i>jambu-dvīpa</i>"</p>		
<p>The following is from Mason's work on Burma (1860) p 451 :— According to Burman geography there is a <i>Eugenia</i> tree on the great island or continent which we inhabit — that is twelve hundred miles high one hundred and eighty six in circumference with five principal branches, each six hundred miles long From this tree the island derives its name <i>Jambudeba</i> <i>Eugenia</i> island Buchanan, in his 'Statistics of Dinaj</p>		

**EUGENIA
malaccensis****The Malay Apple****MEDICINE**

Leaves

435

FOOD

Fruits

436

TIMBER

437

DOMESTIC

438

439

FOOD

440

TIMBER

441

442

TIMBER

443

444

445

pur" p 156 referring to this tree also says — The Indians indeed are said to have given its name to their position of the world, *Jambudwip* or the Island of the Jumbu tree' It may be here added that the Rose-apple is wrongly referred by Yule Mason and others to *E. Jambolana*.

Medicine — In Bhamo Upper Burma the LEAVES are boiled and used as a medicine for sore eyes

Food — The FRUIT which is usually produced during the rainy season, is about the size of a small apple By many persons it is highly esteemed on account of its delicate flavour which resembles rose water but there is a want of juice which renders it unpalatable In the neighbourhood of Calcutta the fruiting branches are covered with pieces of cloth and this is believed to increase the size as well as the flavour of the fruit A preserve is sometimes made of the fruit

Structure of the Wood — Reddish brown' (*Brands*)

Domestic Use — In Burma the leaves are said to be much prized for ornamental purposes

Eugenia javanica, Lamk ; *Fl Br Ind*, II, 474; *Wight Ic*, t 548

Syn — *E. ALBA* Roxb

Vern — *Jamrool amrool* HIND

References — *Roxb Fl Ind Ed C B C* 400 *Voigt Hort Sub Cal* 48; *Kurs For Fl Burm I* 494 *Trimen Hort Zeyl* 33

Habitat — A tree of Malacca Andaman and Nicobar Islands In introduced into Bengal where it is now common chiefly in gardens

Food — Produces abundantly during the hot and rainy seasons a fruit which when ripe is pure white and shining though juicy and refreshing it is almost tasteless it is eaten however by all classes of people

Structure of the Wood — Red rough and hard' (*Gamble*)

E. Kurzii, *Duthie Fl Br Ind II* 478

Syn — *E. CERASIFLORA* Kurs

Vern — *Jámun* NEPAL *Sunom* LEPCHA

References — *Kurs For Fl Burm I* 491 *Gamble Man Timb* 193 *Journ As Soc Beng XLVI* (1877) 11 68

Habitat — A large evergreen tree met with in the hills of Bengal and Burma from 3 000 to 6 000 feet

Structure of the Wood — Reddish grey moderately hard rough (*Gamble*)

E. malaccensis, Linn *Fl Br Ind*, II 471 *Wight Ic*, t 98

MALAY APPLE or the KAVIKA TREE

Syn — *JAMBOSA MALACCENSIS* DC

Vern — *Maláka jamrul* BENG *Nat: shambu* (Rheede) | *MALAY Tha byoo-thabyay* BURM

References — *Roxb Fl Ind Ed C B C* 397 *Voigt Hort Sub Cal* 47 *Kurs For Fl Burm I* 493, *Gamble Man Timb* 193 *DC Origin Cult Pl* 241 *Trimen Hort Zeyl* 33 *Rheede, Hort Mal I* 29 t 18 *Lisboa U Pl Bomb* 155 *Baron F von Müell Sel Extra-Trop Pl* 167 *Smith Dic* 260 *Mason Burma* 450

Habitat — A handsome tree with a profusion of either white or scarlet flowers followed by an abundance of fruit of the size of a small apple It is a native of the Malay Islands and is now cultivated in Bengal and Burma chiefly in gardens The Malay looks upon the *Kavika* tree as representing all that is lovely and beautiful

The note by Paludanus appended to Linschoten's description of the Rose-apple tree evidently refers to *E. malaccensis*. He mentions the fact of its having been first brought out of Malacca into India, and he describes the flowers as 'of a reddish purple colour,' and the fruit "as

E 445

The Eugénias.	(F F Duthie)	EUGENIA operculata.
<p>bigge as a Pear. He also says — "There are two sorts of this fruit, one a browne red seeming as though it was black most part without stones and more savory than the other which is a pale red or a pale purple colour with a lively smell of roses</p>		<p>DESCRIPTION.</p>
<p>Food.—Produces at different periods of the year a large, juicy fruit which is very commonly eaten though rather insipid (Roxb) The pulp of the fruit is said to be wholesome and agreeable Paludanus (l c) says — (This fruit is ordinarily eaten before other meate be set upon the table and also at all times of the day</p>		<p>FOOD 446</p>
<p>Structure of the Wood.— Reddish grey rough soft Weight, Wallfisch gives 30 our specimen 38½ per cubic foot" (Gamble)</p>		<p>TIMBER 447</p>
<p>Eugenia montana, Wight, Fl Br Ind II, 488, Wight, Ic, t 1060</p>		<p>448</p>
<p>References.—Beddome For Man 107 Ind For X 552</p>		
<p>Habitat.—A large tree, common on the higher ranges of the Nilghiris.</p>		
<p>Structure of the Wood.— Is in use for building purposes, &c (Beddome)</p>		<p>TIMBER. 449</p>
<p>E. oblata, Roxb, Fl Br Ind II, 492; Wight Ic, t 622</p>		<p>450</p>
<p>Vern.—Goolum (Roxb) CHITTAGONG Thabyay-nee BURMA</p>		
<p>References.—Roxb Fl Ind, Ed C B C 400; Voigt Hort Sub Cal, 48 Kurs For Fl Burm II 488</p>		
<p>Habitat.—A tree found in Eastern Bengal Burma, Penang and Singapore In Chittagong it is cultivated for its fruit</p>		
<p>Food.—The fruit about the size of a cherry is according to Roxburgh edible</p>		<p>FOOD 451</p>
<p>Structure of the Wood.—Roxburgh also states that the wood is in some estimation</p>		<p>TIMBER 452</p>
<p>E. obovata, Kurs a variety of <i>E. operculata</i>.</p>		
<p>E. operculata, Roxb Fl Br Ind, II, 498 Wight, Ic, t 552 &</p>		<p>453</p>
<p>Syn.—E CERASOIDES, Roxb [615</p>		
<p>Vern.—Rajaman paman jamawa dugdugia HIND; Topa Kol Totonopuk SANTAL Bote-jam (Roxb) CHITTAGONG; Teathabyay (yethabyay) thabyay-chin BURM; Batatdomba SING</p>		
<p>References.—Roxb Fl Ind Ed C B C 398 Voigt Hort Sub Cal 49 Brandis For Fl 234; Kurs For Fl Burm I 483 & 484, For Man 106, Gamble Man Timb 194 Thwaites En Ceylon Pl 417 Trimen Hort Zeyl, 33, Atkinson Econom Prod, N W Prov 74 For Adm Report Ch Nagpur 1885 31</p>		
<p>Habitat.—A moderate-sized or even large evergreen tree, met with in the sub-Himalayan tract from the Jumna to Assam up to 2 000 feet in the forests of Chittagong Burma the Western Gháts, and in Ceylon up to 3 000 feet Brandis says that under favourable conditions it grows to be one of the largest and most handsome trees of the genus. The leaves turn bright red before falling</p>		
<p>Medicine.— The FRUIT is eaten for rheumatism; the root, boiled down to the consistence of gur is applied to the joints by rubbing; the LEAVES are much used in dry fomentation the BARK is also employed medicinally (Rev A Campbell Chutia Nagpur)</p>		<p>MEDICINE. Fruit. 454 Bark 455</p>
<p>Food.—It yields an edible FRUIT which ripens towards the end of the hot weather</p>		<p>FOOD Fruit. 456</p>
<p>Structure of the Wood.—"Reddish-grey hard, used for building and agricultural implements (Gamble)</p>		<p>TIMBER 457</p>
<p>Var obovata, Kurs Fl Br N I II 498 Sp (Wall., Gamble 194)</p>		<p>458</p>
<p>Syn.—SYZYGIUM OBOVATUM Wall</p>		
<p>Vern.—Kiamoni NEPAL Jung song, LEPCHA; Boda jam, MICHI</p>		
<p>References.—Kurs, For Fl Burm., I., 482; Gamble M n Timb, 194 For Adm Report Ch Nagpur 1885, 31</p>		

EULOPHIA.**The Eugenias, Salep**

- TIMBER.**
 459
 460
Habitat.—Found in the savannah forests of Bengal and Burma.
Structure of the Wood.—Grey rough moderately hard
Var *Paniala* (Roxb sp) *Fl Br Ind*, II, 498
Vern.—*Pamala jamb* BENG
Reference—Roxb *Fl Ind Ed C B C* 399
Habitat.—Found in Chittagong Sylhet and Burma Roxburgh describes it as one of the largest and most robust trees of the genus.
Food—The FRUIT ripens in June and is about the size of a small gooseberry and very juicy (Roxburgh)
FOOD
Fruit
 461
Eugenia Pimenta, DC, see *Pimenta officinalis*.
E salicifolia, Wight; see *E Heyneana*.
E ternifolia, Roxb see *E formosa*
 462
E tetragona, Wight *Fl Br Ind*, 497
Vern—*Kemma chamlani* NEPAL *Sunóm* LEPCHA
References—Voigt *Hort Sub Cal* 49 Kuhn *For Fl Burm*, I 484
Gamble Man Timb 194
Habitat—A large evergreen tree found in the hills of Northern Bengal up to 6000 feet and in Chittagong
Structure of the Wood—Brownish or olive-grey shining hard it is used occasionally for building for the handles of tools and for charcoal
TIMBER
 463
 464
E zeylanica, Wight *Fl Br Ind II* 485 *Wight Ic* 73
Vern—*Sagarabatna* URIYA *Bhedas* MAR *Nerkal* KAN *Thabye* PAUK BURM
References—Roxb *Fl Ind Ed C B C* 402 *Kur For Fl Burm I* 481 *Beddome Fl Sylv ccs* *Thwaites En Ceylon Pl* 118 *Dals & Gibs Bomb Fl* 94 *Rheede Hort Mal V t 20 Gas Bomb XV Pt I* 68
Habitat—A small myrtle like shrub of the scrubby forests of Orissa; a shrub or small tree in the Concan and southwards also in Sylhet the Malay Peninsula and the Andamans
Structure of the Wood—In Kánara it is used for building purposes and for field tools
TIMBER
 465
 466

EULOPHIA, R Br ; Gen Pl III, 535

The *salep* obtainable in Indian bazars has been ascertained to be the product of two species of *Eulophia*, viz *E campestris* and *E herbacea* and possibly of others *Salep* or *sálib misri* consists of the dried tubers of the above mentioned orchids and of several species of *Orchis*, which latter constitute the bulk of the *salep* of European commerce Its oriental reputation as an aphrodisiac was founded merely on superstition in connection with the so-called doctrine of signatures It possesses no medicinal properties whatsoever A decoction prepared from powdered *salep* and flavoured with wine and spice is considered a more or less nutritious and agreeable drink for invalids Mr J G Baker of Kew in the discussion which followed the reading of Dr Aitchison's paper before the British Pharmaceutical Society (December 8th 1886), said that Dr Aitchison had practically disposed of the much-debated question as to the source of the *Royal salep* or *badyah* Mr Baker, acting on a suggestion made by Hanbury said that this form of *salep* resembled a bulb more than a tuber and that he had succeeded in tracing out what appears to be the source of that drug Dr Aitchison had brought fresh specimens of these bulbs, and they proved to be *Ungernia trispheera*, a plant belonging to the AMARYLLIDACEÆ Dr Dymock writes that the *salep* of Bombay commerce is imported from Persia Cabul and Northern India, and is probably obtained from various species of *Orchis* under which genus further information on this product will be found (For further information see *Curculigo Orchoides*, Vol II, 650)

Salep; Euonymus.

(J F Duthie)

EUONYMUS
glaber**Eulophia campestris, Lindl , ORCHIDÆ****Vern.**—*Sung-misri* (Irvine) **BENG**; *Bonga tami* **SANTAL**; *Hatti-paila* **NEPAL** *Sālib-misri* **Pa**; *Sālum*, **Guz****References**—*Stewart Pb Pl* 236 *Dymock Mat Med. W Ind*, 789; *S Arjun Bomb Drugs* 137 *Murray Pl and Drugs Sind*, 22; *Irvine, Mat Med of Patna*, 101 *Baden Powell, Pb Pr* 252 *Atkinson Him. Dist* 318 *Royle Ill Him Bot* 370; *Balfour Cyclop I* 1060 *Rev A Campbell's Report on Econ Prod Chutia Nagpur Eulophia sp?***Habitat.**—An orchid found in Oudh and Rohilkhand and in the Gangetic Doab; also according to Aitchison in the Panjāb on the islands formed by the recurving of the rivers. Dr Stewart records having gathered the tubers near Lahore in the Rāvi Dr Royle mentions that the plant was of common occurrence in and near the Kherree Pass. Admirable samples of what appear to be the salep of this orchid were recently sent to the writer from the Sirohi State Western Rajputana**Medicine.**—By the natives the *salep* is chiefly esteemed as a tonic and aphrodisiac**SPECIAL OPINIONS**—§ ' Salep is considered as nutritious and is largely consumed by persons suffering from phthisis and other exhausting diseases (*Surgeon Major A S G Jayakar, I M D Muskat Arabia*)Useful form of congee for nursing mothers (*Surgeon Major G Y Hunter Karachi*) Is extensively used in cases of impotence and when lithates of a pink colour are passed in the urine, a condition which the native hakims almost always confuse with spermatorrhœa (*Surgeon Major C W Calthrop M D Morar*) *Salip misri* is very useful as a diet in dysentery the tubers should be grated and boiled down in milk (*Civil Surgeon George Cumberland Ross Delhi Panjāb*) Used in spermatorrhœa and impotence Infusion made from pounded tuber" (*Civil Medical Officer Mr Forsyth F R C S Ed Dinagapore North Bengal*)**Food**—The Europeans in Northern India and at some of the Himālayan and Nilghiri hill stations collect the tubers of this and other allied species and use them for family consumption as salep they regard them as an easily digestible kind of farinaceous food

467

MEDICINE.
468**FOOD**
469

470

E herbacea, Lindl**Syn.**—*E VERA* Royle (?)**References**—*Stewart Pb Pl* 236 *Lindl Gen and Sp Orchid* 182 *Royle Ill Him Bot* 366 and 370 *Balfour Cyclop I* 1060**Habitat**—Royle's specimens named by him *E vera*, were gathered near the banks of the Jhelam river in the Panjāb Himalaya This he believed to be the source of the true *salep misri* of commerce and distinct from that of *E. herbacea* According to other writers this species occurs on the mountains of South India**EUONYMUS, Linn Gen Pl, I 360****Euonymus crenulatus, Wall , Fl Br Ind I, 608 Wight Ic,****References.**—*Beddome Fl Sylv t* 144 *Gamble, Man. Timb.* 84 *Drury U Pl* 203 *Balfour Cyclop I* 1060**Habitat**—A small tree common in hilly parts of South India**Structure of the Wood.**—White very hard and close grained, answers for wood engraving and is about the best substitute for boxwood in the Madras Presidency (*Beddome*)

471

TIMBER.
472

473

E glaber, Roxb Fl Br Ind I, 609**References.**—*Roxb Fl Ind*, *Ed C B C*, 211; *Voigt, Hort Sub Cal*, 165 *Kurz For Pl Burm I* 249**E 473**

**EUONYMUS
pendulus.****The Euonymus****TIMBER.**
474

Habitat.—A small tree found in East Bengal and in Burma.
Structure of the Wood.—Brownish yellow turning brown; heavy, rather close-grained and hard, but soon attacked by xylophages. Fine wood for furniture (*Kurs*).

475**Euonymus grandiflorus, Wall ; Fl Br Ind, I, 608****Syn.**—*E. LACERUS* Ham**Vern.**—*Siki pattals papar banchir dudhapar hanchu pash, mara chikan rangchul kioch* PB ; *Gule grus* SIMLA**References.**—Voigt Hort Sub Cal 166 Brandis For Fl 78 ; Gamble Man Timb 84 Wall Pl As Rar., III 35 t 254 ; Atkinson, Him Dist, 307**Habitat.**—A small deciduous tree of the Himálaya from the Indus to Sikkim between 6 000 and 11,000 feet**Fodder.**—The young shoots and leaves are lopped to feed goats.**Structure of the Wood.**—White moderately hard exceedingly compact close and even grained It is used for carving (*Gamble*)**Domestic Use.**—According to Brandis the seeds with their bright red arils are strung up and used as ornaments in Bussahir**FODDER.****476****TIMBER.****477****DOMESTIC****478****479****E. Hamiltonianus, Wall Fl Br Ind, I 612****Syn.**—*E. ATROPURPUREUS* Roxb**Vern.**—*Agnun agnu* KUMAON *Brahmanis* KASHMIR ; *Siki singi chual matal papar rithu ranis banchor harun shioch sidhera naga* PB**References.**—Roxb Fl Ind Ed C B C 211 Voigt Hort Sub Cal 105 ; Brandis For Fl 78 Gamble Man. Timb 84 Stewart Pb Pl, 41 U S Dispens 15th Ed, 507**Habitat.**—A large deciduous shrub or small or occasionally moderate-sized tree of the outer Himalaya from the Indus to Bhután and of the Khásia Hills from 4 000 to 8 000 feet (*Gamble*)**Fodder.**—The young leaves and shoots are lopped for fodder (*Brandis*)**FODDER.****480****TIMBER****481****Structure of the Wood.**—White with a slightly yellow tinge, soft, close grained It is used for carving into spoons (*Gamble*)**E japonicus, Wall, see E pendulus, Wall.****482****E pendulus, Wall Fl Br Ind I 612****Syn.**—*E. JAPONICUS*, Wall (not of Thunb)**Vern.**—*Chopra pincho garúr kunkhu* N W IP**References.**—Brandis For Fl 79 Gamble Man. Timb 84 Atkinson Him Dist 307**Habitat.**—A moderate-sized evergreen tree, found in the Himálaya from the Jhelum to Nepal between 2 500 and 7 500 feet (*Gamble*)**CHEMISTRY****483****Chemistry.**—Dr Dymock writes the following as the result of his analysis of a specimen of the bark furnished by Dr G Watt from Simla —

The young branches give a green tincture with spirit and the older bark a red tincture in each case on dissipating most of the alcohol and treating with water a greenish yellow resinous substance falls and a bright red liquid remains The resins are soluble in ether and partly in alkalies and the red astringent supernatant liquor contains tannin giving a murky green colour with a ferric chloride and a quantity of saccharine matter No bitterness was perceived in the extract and nothing alkaloidal was detected The aqueous extract of the bark, after exhaustion with spirit, contained a large quantity of a white, neutral crystalline body which was dissolved by hot alcohol and crystallized out on cooling The bark had no marked odour or taste and afforded a light buff-coloured powder The powder treated directly with rectified spirit, gave 45.5 per

E 483

Aya-Pana, The Hemp Agrimony (♀ *F Duthse*)EUPATORIUM
cannabinum.

cent of extract and when burnt left 12.8 per cent of carbonated ash. The crystalline body appears to be mannite. Mr Hooper does not think that this bark or that of *E. crennatus*, are likely to replace that of *E. atropurpureus*. If we could find an *Euonymus* with a bitter bark a better result might be obtained.

Structure of the Wood.—White, moderately hard, compact, with a light red tinge very close and even grained

Enonymus tingens, Wall Fl Br Ind I 610

Vern.—*Newar hasāri* NEPAL; *Kunghu*, N W P; *Chopra*, *mer mahaul* SIMLA

References.—*Brandis For Fl 79 Gamble Man Timb 85 O'Shaughnessy Beng Dispens 272 Royle Ill Him Bot 167*

Habitat.—A small evergreen tree of the Himalaya, from the Sutlej to Nepal between 6500 and 10000 feet (*Gamble*)

Dye.—The inner BARK is said to yield a beautiful yellow dye.

Medicine.—*Royle* was informed of the PLANT being used in diseases of the eye

Structure of the Wood—Similar to *E. grandiflorus*, except that the wood of this species has a slightly reddish tinge

Domestic Use.—The dye is said to be used in Nepal for marking the *tika* on the foreheads of Hindus

EUPATORIUM, Linn ; Gen Pl, II, 245

Eupatorium Ayapana, Vent Fl Br Ind III, 244 COMPOSITÆ

References.—*Pharm Ind 127 O'Shaughnessy Beng Dispens 422 Dymock, Mat Med W Ind 424 Fleming Med Pl and Drugs as in As Res Vol XI 166, U S Dispens 15th Ed 569 S Arjun Bomb Drugs 78 Fleming New Pl and Drugs in As Res XI., 167 K L Dey, Indig Drugs of Ind 53 Drury U Pl 203 Balfour Cyclop 1061 Mueller Select Extra Trop Pl 168*

Medicine.—A small aromatic shrub naturalised in many parts of India and known under its Brazilian name, *Aya pana*. For long it held a high position as a medicinal plant but the exaggerated ideas of its virtues have now exploded. It is a good simple stimulant tonic, and diaphoretic. In cholera it has been used to restore warmth to the body, and it is said also to be used internally and externally in the treatment of snake-bite. *Fleming* (in *Anat Res l.c*) says that instances are not unfrequent of medicines which had been at first too highly extolled having afterwards met with unmerited neglect and such may perhaps be the case in respect to the plant in question. *Dymock* says that it is not uncommon in gardens in Bombay and though not generally known, is held in considerable esteem by those who are acquainted with it

E cannabinum, Linn , Fl Br Ind III, 243

THE HEMP AGRIMONY

References.—*Voigt Hort Sub Cal 407; Fleming Med Pl and Drugs in As Res Vol XI 167*

Habitat.—Exceedingly plentiful tall erect plant, with downy leaves and terminal crowded head of dull purple flowers, inhabiting damp watery places on the temperate Himalaya, Khasia Hills and Burma, between 3000 and 6000 or even up to 10000 feet in altitude

Medicine.—'Was strongly recommended by *Tournefort* as a deobstruent in visceral obstructions consequent to intermittent fevers, and externally as a discutient in hydropic swellings of the legs and scrotum' (*Fleming, in Anat Res l.c*)

TIMBER

484

485

DYE

Bark

486

MEDICINE

Plant.

487

TIMBER.

488

DOMESTIC

489

490

MEDICINE

491

492

MEDICINE.

493

EUPHORBIA
antiquorum.**The Euphorbias**

494

EUPHORBIA, Linn, Gen Pl, III, 258

A large genus containing more than 600 species which are widely distributed over the greater part of the world. They are popularly known as Spurge-worts a name which is sometimes applied to the whole family. Linnæus is said to have named the genus after Euphorbus a physician to Juba, King of Mauritania. The species consist of herbs or shrubs but in some instances they assume the form of small cactus like trees with thick soft wood jointed branches. Though differing so widely in general appearance they can generically easily be recognized by the structure of their flowers. The monœcious flowers are arranged in clusters and each cluster consisting of several jointed stamens (male flowers) surrounding a single female flower is enclosed within a common involucre. All the species abound in a more or less acrid milky juice which contains active medicinal properties. The most important extract known under the name of **Euphorbium** is obtained chiefly from **E. resinifera**, one of the fleshy stemmed species indigenous to Morocco. This resinous substance used to be given as a purgative and emetic but owing to its extremely powerful action it is now never used as an internal remedy. Its anticorrosive properties have recently created a demand for it as an ingredient of paint for ships bottoms. **Euphorbium** occurs in small roundish masses resembling tragacanth; it is of a light yellow or reddish colour it has no smell and its taste at first slight becomes painfully acid and burning.

Its chemical composition according to Flückiger (1868) is as follows —

Amorphous resin, $C^{10} H^{16} O^8$	38
Euphorbon $C^{18} H^{31} O$	22
Mucilage	18
Malates chiefly of calcium and sodium	12
Mineral compounds	10
	<hr/> 100 <hr/>

The amorphous resin is readily soluble in cold spirit of wine containing about 70 per cent of alcohol. The solution has no acid reaction but an extremely burning acrid taste in fact it is to the amorphous indifferent resin that **Euphorbium** owes its intense acidity (*Flück and Hanb Pharmacog* 560). See also *Spons Encyclop II* 1649 *U S Dispens 15th Ed* 1641 *Ainslie Mat Med I* 120.

CHEMISTRY
495

496

Euphorbia antiquorum, Linn Fl Br Ind V 255 Wight Ic

[t 897 EUPHORBIAEÆ

Vern — *Tindhra sehund tindhra sehnur, tindhra sehnd* HIND *Nara siy tekhta siy bayaran lariya-dona* BENG; *Ethec* SANTAL *Dokéna siyu* URIYA *Shidu MICH* *Tidhari send tin dhari send*, DECCAN *Na aseja* MAR *Tandhári send* GUZ *Shadhurah halli shadray kullie* (Ainslie) *tirkalli* TAM *Bomma jemudu bonta-chemudu* TEL *Buma chumadoo* (Roxb) *mudu mula jemudu* KAN *Katak-kalli chatrah halli sudusudu* MALAY *Shasoung-pya thal shaséno-yi* BURM *Daluk* SING *Situnda wajri sechoondee* (Roxb) *wajra kantaka* SANS *Zaqqume-hindi* ARAB *Zaqqunnya hindi zaqqume-hindi* PERS

References — *Roxb Fl Ind Ed C B C* 302, *Voigt, Hort Sub Cal* 162 *Brandis For Fl*, 438 *Kur, For Fl Burm II*, 416 *Boddome For Man* 216, *Gamble Man Timb* 368 *Dals & Gids Bomb Fl* 226, *Elliot Fl Andhrica* 29; *Trimen Hort Zeyl* 70 *Rheede Hort Mal II* t 42 *Pharm Ind* 204 *Ainslie Mat Ind I* 121; *O Shaughnessy Beng Dispens* 564 *Moodeen Sheriff Supp Pharm Ind* 136 *U C Dutt Mat Med Hind* 322 *S Arjun Bomb Drugs* 198, *Drury U Pl* 203 *Lisboa, U Pl Bomb* 114 *Atkinson Gums and Gum resins* 29 *Gums and Resinous Prod of India* (P W D, 1871) 28 *Balfour Cyclop I* 1061 *Treasury of Bot* 477 *Low Off Guide to the Mus of Ec Bot* 115 *Home Dept Cor regarding Pharm Ind* 240.

E 496

The Euphorbias

(J F Duthie)

**EUPHORBIA
granulata.**

Habitat.—A shrub or small tree with three- or five- angled branches, common on the dry hills of Bengal and the Peninsula generally Mr J O Hardinge states that it is common all over Burma, being often cultivated for hedges

Gum—This species was supposed for a long time to be capable of yielding the commercial Euphorbium resin Buchanan Hamilton (*Linn Trans Vol XIV*) and Royle (*Ill 1 328*) have however, clearly demonstrated that the true Euphorbium is not a product of India

Medicine.—The JUICE which flows from the branches is used as a purgative to relieve pain in the loins It is an acrid irritant in rheumatism and toothache When taken internally it acts as a drastic purgative It is also employed in nerve diseases dropsy palsy deafness and amaurosis (*Baden Powell*) A plaster prepared from the roots and mixed with asafetida is applied externally to the stomachs of children suffering from worms The bark of the root is purgative and the stem is given in decoction in gout (*Wight Rheede*) The Rev A Oampbell states that a preparation from the plant is in Chutia Nagpur given as a cure for cough

SPECIAL OPINIONS—§ The fresh juice of cut branches is irritant it is applied to painful joints (*Shib Chunder Bhattachary Chanda Central Provinces*) The juice mixed with burnt borax and common salt is used as an application in painful joints and swellings The fresh milky juice is a direct irritant both when taken internally and applied externally Taken in very small quantities it is a drastic purgative It is also used as an antidote in cases of snake bite. (*Civil Surgeon J H Thornton, B A M B Monghyr*)

Fodder—The Rev A Oampbell states that in Chutia Nagpur goats and sheep feed on this plant

Structure of the Wood—‘White light soft but even grained (*Brandis*)’

Domestic Uses—‘This plant is supposed to ward off lightning strokes and is generally kept in tubs or pots on the roofs or other exposed parts of native houses (*U C Dutt*) This fact is also corroborated by *Shib Ohunder Bhattachary Chanda, Central Provinces*

GUM
497MEDICINE,
Juice,
498Roots,
499Bark
500
Stem
501FODDER
502TIMBER
503DOMESTIC,
504

505

Euphorbia dracunculoides, Lam ; Fl Br Ind V, 262

Syn.—E LANCEOLATA Heyne E UNIFLORA Wall

Vern.—*Jy chee chhagul-puputi* BENG *Parwa SANTAL* ; *Ricins suddh* (the fruit) *kang* (the plant) PB *Tilla kada* TEL

References—*Roxb Fl Ind Ed C B C 304 Voigt Hort Sub Cal 164 Stewart Pb Pl 193 Aitchison Cat Pb and Sind Pl 131 ; Fl Andhrica 182 Spons Encyclop II 1414*

Habitat—A much branched annual met with in the Panjáb Bengal Madras (Coromandel) and Konkan

Oil—It yields a limpid clear oil of a yellowish or greenish-yellow colour used as a drying oil and for burning In 1843 it was submitted to London brokers who pronounced it more valuable than linseed oil The *Agri Horticultural Society of India Journ 1843* “ p 52 draws attention to this oil

Medicine.—The FRUIT is officinal and is said to be used to remove warts

OIL,
506MEDICINE.
Fruit,
507
508**E granulata, Forsk Fl Br Ind, V, 252**

Syn.—E ARILLATA, Edgew

Vern—*Kantha arak* SANTAL

References—*Edgew in Journ As Soc Beng XVI 1218*

Habitat.—A hispid perennial herb with prostrate stems, inhabiting the plains of Northern and Central India from Rohilkhand to Sind

E 508

EUPHORBIA
microphylla**The Euphorbias.****FOOD**
Leaves.
509**Food**—"The **LEAVES** are eaten as a pot herb by the Santals" (*Rev A Campbell*)**Euphorbia helioscopia**, *Linn*, *Fl Br Ind*, *V*, 262**SUN SPURGE****Vern**—*Hirrusseah mahabi* **HIND**; *Ganda bâte dâdal kulfâ-dodah chatriwal*, **PB****References**—*Stewart Pb Pl* 193; *Atchison Cat Pb and Sind Pl* 132 *Murray Pl and Drugs Sind* 32**Habitat**.—A common field weed in spring throughout the Panjâb plains and the Siwalik tract ascending to 7 000 feet in the outer Himâlâya. Introduced into the Nilghiri hills**Medicine**.—The milky **JUICE** is applied to eruptions and the **SEEDS** are given with roasted pepper in cholera. The juice is also used in the form of a liniment in neuralgia and rheumatism and the **ROOT** is employed as an anthelmintic (*Murray*)**MEDICINE**
Juice and
Seeds.**510**
Roots**511****512****E hypericifolia**, *Linn* *Fl Br Ind*, *V*, 249**Syn.**—**E INDI A** Lamk **E PARVIFLORA** *Linn***Vern**.—*Hasârdâna* (seeds and leaves) **PB**; *Nayeti BOMB*; *Dhâkti dudhi* **MAR**; *Ela-dada kiriya* **SING****References**—*Roxb Fl Ind Ed C B C* 394 *Vogt Hort Sub Cal* 163 *Thwaites En Ceylon Pl* 268 *Dals & Gibs, Bomb Fl* 227; *Stewart, Pb Pl* 194 *Atchison Cat Pb and Sind Pl* 132 *Trimen Hort Zeyl* 71 *Rheede, Hort Mal X* t 51 *Dymock, Mat Med W Ind and Ed* 694 *U S Dispens 15th Ed* 1640 *S Arjun Bomb Drugs* 124 *Atkinson Him Dist* 317 *Treasury of Bot* 477**Habitat**.—A small slender annual common throughout the hotter parts of India (from the Panjâb to the Southern Deccan) and occurring up to 4 000 feet on the Himâlâya**MEDICINE.****Medicine**.—*Stewart* mentions that in some parts of the Panjâb it is given with milk to children suffering from colic **S Arjun** remarks that it possesses properties similar to those of **E pilulifera** and **E thymifolia**. **Dr W Zollickoffer** (in *Am Journ of Med Soc XI* 22) recommends an infusion of the dried **LEAVES** of this herb as a remedy in dysentery diarrhoea menorrhagia and leucorrhœa and finds that it affects the system as an astringent and feeble narcotic**Leaves**
513**514****E Lathyris**, *Linn***CAPER SPURGE** *Eng***Vern**—*Burg sadab* (*Irvine*) **BENG**; *Sudab* **PB****References**—*Ainslie Mat Ind I* 599 *O'Shaughnessy Beng Dis pens* 565 *U S Dispens 15th Ed* 1713 *Irvine Mat Med Patna* 18 *Am Journ Pharm XXVI* 305 *Spons Encyclop II* 1414**Habitat**.—A perennial herb with narrow glaucous leaves a native of Central and South Europe.**Oil**—The **SEEDS** yield by expression or by the agency of alcohol or ether a colourless tasteless **OIL****OIL.**
Seeds.**515**
MEDICINE
oil
516**Medicine**.—The **OIL** formerly found much favour with certain French and Italian physicians as a purgative owing to its tastelessness (when fresh) and because of the small amount required for a dose. In this country the seeds are said to be used in dropsy and also to procure abortion. According to *Irvine (Mat Med of Patna)* the imported dried leaves fruits and stalks are used as a carminative in dyspepsia, and as a deobstruent**DOMESTIC****Domestic Use**.—The capsules are said to intoxicate fish**517**
518**E microphylla**, *Heyne*, *Fl Br Ind*, *V*, 252**Syn.**—**E UNIFLORA** *Dals & Gibs*; ? **E CHAMÆSYCE** *Roxb***E 518**

The Euphorbias.

(*f* & *Duthie*)

EUPHORBIA
neriifolia.

Vern.—*Choto-berusa* (Voigt), BENG; *Dudhia-phul* SANTAL

References.—*Roxb*, *Fl Ind*, Ed. C B C, 394 *Voigt*, *Hort Sub Cal* 163 *Dals & Gibs Bomb Fl* 227 *Aitchison Cat Pb and Sind Pl*, 131 *Rev A Campbell Report Econ Prod Chutia Nagpur No 7921*

Habitat.—A slender, prostrate, much branched annual, found in Bengal Bundelkhand Southern India, and Burma.

Medicine.—The Rev A Campbell mentions that in Chutia Nagpur a preparation of this plant, along with that of *Cryptolepis Buchananii*, (Vol II 624) is given to nursing mothers when the supply of milk fails or is deficient.

MEDICINE.
519

Euphorbia neriifolia, Linn *Fl Br Ind, V, 255*

Syn.—*E LIGULARIA Roxb*

Vern.—*Sekund thohar sij patton-ki send*, HIND; *Mansa-tij pāta shiy hij-dāna* BENG, *Gāngichu* PB; *Nivadunga minaguta, thohur* SIND; *Kutte-ki jibh ki send kutte ki jibh ka-patta*, DECCAN; *Minguta thor newarang* BOMB, *Nivadunga mingut* MAR; *Thor*, GUZ; *Nevul kanta* GOA *Ilash kalli* TAM; *Ahu jemudu* TEL; *Yalekalli* KAN; *Elakalli* MALAY *Shasaung sha soung shandon mina* BURM; *Patuk SING Snuhi* (U O Dutt) *vujri sekunda* SANS

References.—*Roxb Fl Ind* Ed C B C, 392 *Voigt Hort Sub Cal* 161 *Brandis For Fl* 439, *Kurz For Fl Burm* II 416, *Beddome For Man* 216, *Gamble Man Timb*, 368 *Dals & Gibs Bomb Fl* 226; *Stewart Pb Pl* 195 *Aitchison, Cat Pb and Sind Pl*, 132 *Trimen, Hort Zeyl* 71, *Pharm Ind* 204 *O'Shaughnessy Beng Dispens* 564 *Mooden Sheriff Supp Pharm Ind* 137, *U C Dutt Mat Med Hind* 233 and 318 *Dymock Mat Med W Ind* and Ed 689, *S Arjun Bomb Drugs* 198 *Irvine Mat Med Patna* 65 *Atkinson Him Dist* 317; *Drury, U Pl* 205; *Lasboia U Pl Bomb* 114 275 *Balfour Cyclop* I 1061 *Trea sury of Bot* 477 *Bomb Gas VI* 14 XV 68 *Journ Agri Hort Soc VIII* pp 223-226

Habitat.—A small erect, glabrous tree, with fleshy cylindrical stems spirally twisted 5 angled branches and sharp stipular thorns at the bases of the subterminal fleshy leaves. It is found wild on rocky ground in Central India and is extensively cultivated in the neighbourhood of villages in Bengal and elsewhere. It is cultivated and according to Kurz is also found wild in Burma. Distribution to Baluchistan Malay Islands, &c

Gum.—It yields a gum or GUTTA PERCHA LIKE substance, on boiling

Medicine.—The milky JUICE is considered purgative and rubefacient. As a purgative it is generally used in combination with other medicines which are steeped in it. Chebulic myrobalan long pepper *trivrit* root &c. are thus treated and administered as drastic purgatives in ascites anasarca and tympanitis. It enters into the composition of several compound prescriptions of a drastic character' (*U C Dutt, Mat Med Hind* 233). The root mixed with black pepper is employed in cases of snake-bites both internally and externally. Every part abounds with an acrid milky juice employed to remove warts and cutaneous eruptions &c. The PULP of the stem mixed with green ginger is given to persons who have been bitten by mad dogs before the accession of hydrophobia (*Taylor Topog of Dacca* 57).

SPECIAL OPINIONS.—§ The juice is employed in ear ache and mixed with soot is employed in ophthalmia as an *anjan*' (*Assistant Surgeon T N Ghose Meerut*). The tender terminal portions of the branches are slightly roasted and the juice is then squeezed out and given with molasses for producing vomiting and purging in bronchitis of children (*Surgeon Major Robb Civil Surgeon Ahmedabad*). Is largely used with clarified or fresh butter as an application to unhealthy ulcers and in scabies. Is also employed as an antidote in snake-poisoning" (*Civil Sur*

GUM
Gutta pereha.

521
MEDICINE.
Juice

522

Root.
523

Pulp
524

EUPHORBIA
pilulifera.**The Euphorbias****TIMBER**
525
SACRED and
DOMESTIC
526

geon *J H Thornton B A M B Monghyr*) The milky juice is applied to glandular swellings to prevent suppuration (*Shib Chundra Bhatta charji Chanda Central Provinces*)

Structure of the Wood—Attains 20 feet stem often 12 inches in diameter

Sacred and Domestic Uses—This shrub is sacred to Mansi the goddess of serpents On the fifth day after full moon of the month Sravana (July August) it is planted in the courtyard of Hindu houses and worshipped as the representative of Mansa' (*U C Dutt Mat Med Hind 233*)

527

Euphorbia Nivulia, *Ham Fl Br Ind V, 255, Wight, Ic t* [1862

Syn—*E. NERIIFOLIA* Roxb

Vern—*Sy BENG Tor raj RAJ Patteoon (O Shaughnessy) DECCAN Newrang MAR Aku jemudu or chemudu TEL Ela calli (Roxb) MALAY Sha soung BURM Pattakarie SANS*

References—*Roxb Fl Ind Ed C B C 302 Voigt Hort Sub Cal 162 Brandis For Fl 439 Kunt For Fl Burm II 417 For Man 216 Gamble Man Timb 368 Dals & Gibs Bomb Fl 225 Elliot Fl Andhr 13 Rheede Hort Mal II t 43 Pharm Ind 204; O Shaughnessy Beng Dispens 555 Moodeen Sheriff Supp Pharm Ind 137 Murray Fl & Drugs Sind 32 Atkinson Him Dist 317 Drury U Pl 206 Balfour Cyclop I 1061 Treasury of Bot 477*

Habitat—A large fleshy stemmed shrub or small tree with smooth roundish whorled branches found in dry rocky places in Northern and Central India also in Burma Often planted for hedges

Medicine—The MILK has properties similar to those of *E. neruifolia*.

MEDICINE
Milk
528
529

E parviflora, see *E. hypericifolia*

E pilosa, *Linn Fl Br Ind V 260*

Habitat—A tall, erect perennial herb found on the Himalaya from Garhwal westward

Medicine—This is no doubt the plant referred to by Stewart under *E. longifolia* Don and the root of which Monigberger mentions as being used for the cure of fistulous sores

MEDICINE
Root
530**531**

E pilulifera, *Linn Fl Br Ind, V, 250*

Syn—*E. HIRTA* Linn

Vern—*Dudhi HIND Bura keru (Roxb) buro kernee (Voigt) BENG Pusi toa, SANTAL Gordon C P Naveti BOMB Dudhi or mothidudhi MAR Dudeli, Guz Amumpatchay arissi TAM Ridarie nanabesam nanabala TEL Ba dada ki iya SING*

References—*Roxb Fl Ind Ed C B C 394 Voigt Hort Sub Cal 163 Dals & Gibs Bomb Fl 227 Atchison Cat Pb and Sind P 132, Elliot, Fl Andhr 129 Timen Hort Zeyl 71 Dymock Mat Med W Ind 2nd Ed 693 S Arjun Bomb Drugs 123 Atkinson Him Dist 317 Christy Com Pl and Drugs No 5 p 64 No 7 p 47 No 8 p 55 No 9 p 35*

Habitat—A small erect or ascending herb with acute hispid leaves (having copious crisped hairs) and small fruits Found throughout the hotter parts of India from the Panjab eastward and southward to Ceylon and Singapore

MEDICINE

Medicine—[Indian writers have very little to say as to the properties of this plant They regard it as equal with *E. thymifolia*, but appear never to have learned that either had a special virtue in the treatment of asthma The following are the only Indian passages the writer can discover that deal with the properties of these plants The PLANT is chiefly used in the affections of childhood in worms bowel complaints and cough Sometimes prescribed also in gonorrhoea (*S Arjun, Bomb Drugs*)

Plant
532**E 532**

The Euphorbias

(J F Duthie)

EUPHORBIA
Royleana.

The Rev A Campbell states that the root is given to allay vomiting, and the plant to nursing mothers when the supply of milk is deficient or fails. Dr Dymock speaks of this species conjointly with *E. thymifolia*, and says they have a reputation as vermifuges. Though Baron F von Mueller is apparently silent as to the merits of *E. pilulifera*, certain popular writers especially in Australia have extolled the weed as a most valuable remedy in the treatment of asthma. Mr Thomas Christy has republished from the Australian newspapers the various letters which have appeared on this subject but Mr O G Levison (in the *Therapeutic Gazette*) has furnished us with a chemical analysis which goes a long way towards destroying the claims of the drug to the consideration Mr Christy has urged. He says the analysis did not demonstrate the presence of anything of importance besides the usual constituents found in most drugs not the least trace of an alkaloid and although it gave off a characteristic odour no volatile substance could be discovered nor any fixed oil. When subjected to destructive distillation a distillate was obtained which had a very powerful and empyreumatic odour somewhat resembling nicotine. Possibly this may be a principle of some importance which later on I will investigate. Experimenting upon its physiological effects Mr Levison found it to act "slightly as a stimulant and narcotic but as far as being a specific for asthma, did not find it to act as such sometimes increasing the sufferings of the patient by producing a more marked dyspnoea. (*Ed Dict Ec Prod*)

Food.—The leaves and tender shoots have according to Dr Shortt, been eaten in the Madras Presidency in times of famine.

Euphorbia pulcherrima, Willd. Fl Br Ind V, 239

POINSETTIA Eng FLOR DE PASQUA, Span

Syn.—POINSETTIA PULCHERRIMA Graham

References.—*Voigt Hort Sub Cal* 164 Brandis *For Fl* 439 *Kurs For Fl Burm II* 418 *Gamble Man Timb* 368

Habitat.—An ornamental shrub discovered in Mexico by Graham in 1828. It is cultivated in most Indian gardens its bright crimson floral leaves appearing about Christmas time.

Gum.—It yields freely a milky sap which hardens into a black gum or may be boiled down to a sort of gutta percha.

E Royleana, Boiss. Fl Br Ind V 257

Syn.—E. PENTAGONA Royle III t 82

Vern.—*Shakar-pitan* (Balf Cycl.) HIND *Sokund* KUMAON; *Shakar pitan*, *thar thor tordanda* (Salt Range) PB *Suli* (J) *chula* (C) *chun* (R) *chu chungu & surs* (B) *suro & tsui* (S) PB HIM *Thor RAJ*

References.—Brandis *For Fl* 438 *Gamble Man Timb* 368 *Stewart Pb Pl* 194 *Atchison Cal Pb and Sind Pl* 132 *Atkinson Him Dist* 736 *Balfour Cyclop I* 1062

Habitat.—A large fleshy shrub common on dry rocky hillsides of the outer Himalaya from Kumaon westwards ascending to 6000 feet. It occurs also on the Salt Range.

Guttapercha.—§ [The milky sap of this plant contains a large amount of superior guttapercha. The sap has when fresh a rich sweet odour and does not blister the fingers even when handled and worked with for hours. It is however very injurious to the eyes and flavours anything handled for days after all trace has been removed from the fingers. (*Ed Dict Ec Prod*)]

Medicine.—The acrid milky juice of this plant possesses cathartic and anthelmintic properties.

Structure of the Wood.—This is probably the species on the dry hills near Jeypur which furnishes a great part of the fuel for that city.

MEDICINE
Root.

533

FOOD
Leaves.534
Shoots.535
530

GUM

537
538GUM
Guttapercha.

539

MEDICINE

540
TIMBER.
541

E 541

EUPHORBIA
thymifolia.**The Euphorbias.**

Attains 15 16 feet ; the stems have generally a girth of 2-3 feet but sometimes of 5 6 feet The wood is soft and useless (Brandis) Near Simla the dry white wood is largely used by the poor classes as fuel

542

Euphorbia, sp

The dried roots of an undetermined *Euphorbia* are used in Kuram as a purgative In large doses it causes vomiting hence it is called the vomit weed The fresh milk of the leaves causes blisters on the hands when collecting the root (*Atchison Kuram Valley Flora in Journal Linnean Society XVIII page 25*) May this not be *E. Thomsoniana* referred to by the author in Vol XIX 1 c page 147?

543

E Thomsoniana, Boiss Fl Br Ind, V, 260

Vern — *Hirtis* (Atchison) KASHMIR

Habitat — A very distinct plant with glabrous simple stems a foot high rising from a perennial root stock It occurs in Western Tibet Gilgit &c at altitudes of 110 000 to 12 000 feet above the sea. *Fl Br Ind*

Medicine — The crushed root stocks are employed by the natives of Kuram as detergents for washing the hair and when boiled are given as purgatives (*Atchison Kuram Valley Flora Linnean Journal XXIX page 147*) In Kashmir the root stock is employed to adulterate *kut* (*Saussurea Lappa*), and is called by the Kashmiris *Hirtis* The STEM ROOT and LEAVES are said to be used medicinally (*Atchison*)

Domestic Uses — The root as a detergent

E thymifolia, Burm Fl Br Ind, V 252

Syn. — *E FOLIATA* Ham *E PROSTRATA* Grah (not of Aston) *E RUBI CUNDA* Bl

Vern — *Chotka dudhi* HIND *Sweet kerua* (Roxburgh), *Shwet keruee* (Voigt) *Dudiya* (Irvine) BENG *Nanha pus toa* SANTAL; *Bara dodak hasrdana* PB *Nayati nayata* BOMB *Mathi dudhi* MAR *Sittrapaladi chin amam patcha arise* (Balf Enc) TAM *Reddi vāri mānu bāla biduru nāna biyyam* * TEL *Bin dada kuriya* SING; *Racta vinda chāda* (O Shaughnessy) SANS; *Hasrdānah* PERS

References — *Roxb Fl Ind Ed C B C 394* Voigt Hort Sub Cal 163 *Dals & Gibs, Bomb Fl 227, Stewart Pb Pl 195, Atchison, Cat Pb and Sind Pl 131 Elliot Fl Andhr 27 & 164 Rheed Hort Mal X t 33 O Shaughnessy Beng Dispens 565; Dymock Mat Med W Ind 693 S Arjun, Bomb Drugs 123 Murray, Pl and Drugs Sind 33 Irvine Mat Med Patna 27 Drury U Pl 206 Balfour Cyclop I 1062 Treasury of Bot 477*

Habitat — A prostrate hairy annual common throughout the greater part of India and Ceylon ascending in Kashmir up to 5,500 feet; often a conspicuous object as a weed on gravel walks

Medicine — The JUICE of this plant is known to be a violent purgative. The dried LEAVES and SEEDS are aromatic and astringent and used in native practice in diarrhoea and dysentery of children along with butter milk (*Murray*) Irvine (*Mat Med 1c*) says that it is common every where and is used as a stimulant and laxative In the Southern Concan according to Dymock the juice is used for the cure of ringworm (hence the name *nayati*) and mixed with chloride of ammonium to cure dandriff O Shaughnessy says that the juice of the stalks and flowers is a violent purgative that the fresh plant is by the Arabs applied to wounds, and the leaves and seeds given by the Tamils in cases of worms and in the

* Elliot remarks — This is a very doubtful name It is, however a Telugu word, and has the signification of green or raw rice of *Biduru* It may however be merely a misprint of *Reddi vāri mānu-pāla* But on the other hand the term raw rice or *pachchi arise*, is applied to several of the smaller species of *Euphorbia* in the Tamil tongue (*Fl Andhrica, p 27*)

E 552

MEDICINE
(Root-stocks.

544

Stem

545

Root.

546

Leaves

547

DOMESTIC

548

549

MEDICINE

550

Leaves.

551

Seeds

552

bowel affections of children Rev A Campbell mentions that the root is used by the Santals in Amenorrhœa

Fodder—Eaten by camels and goats in the Multán District

E Tirucalli, Linn ; Fl Br Ind, V, 254

MILK HEDGE, MILK BUSH, OR INDIAN TREE—SPURGE, Eng

Vern.—*Sehnd sendh, konpal sehnd shir thohar sehund*, (BOMB, Dr Dymock), *Sehnd sehnur HIND*, Lanka *sy, láta dáona*, BENG ; *Siyu SANTAL*; *Seyu lodhoka siyhu ksharissiyu lanka URIYA*; Thora SIND *Send kári-ki send, bar ki-send* DECCAN *Shera thora, thor seyr tej níwal* BOMB *Níwal*, GOA *Shera seyr-teg vajraduhu*, MAR ; *Thordandatio*, GUZ *Tirukali kalli kombu kalli* TAM *Jemudu jemudu kadalu, káda jemudu kalli chemudu manche koyya jemudu kad jemudu* TEL *Bonta kalli newli* KAN ; *Tirukalli, kol kalli* MALAY ; *Sha shoung leknyo, sha soung lek hnyo* BURM *Nawa handi navahandi thovar* SING *Zaqqume hindi asfur sukkum* (Balf Enc) ARAB *Zaquniya hindi shir tothar* (Balf Enc) PERS

References—Roxb *Fl Ind Ed C B C* 303 Voigt *Hort Sub Cal* 162 Brandis *For Fl* 439, Kura *For Fl Burm II* 417 Beddome, *For Man* 217 Gamble *Man Timb* 368 Atchison *Cat Pb and Sind Pl* 133 Elliot *Fl Andhr* 36 73 Rheede *Flort Mal, t* 44 Trimen *Hort Zeyl* 71 Pharm *Ind* 204 O Shaughnessy *Beng Dispens* 563 Moodeen Sheriff *Supp Pharm Ind*, 137 Dymock *Mat Med W Ind* 694, S Arjun *Bomb Drugs* 124 Murray *Pl and Drugs Sind* 33 Irvine *Mat Med Patna* 62, Drury *U Pl* 206 Lisboa *U Pl Bomb* 2 114 268 273 Birdwood *Bomb Pr* 271 336 Liotard *Dyes* 11 Watson *Report on Gums* 28 Gums and Resinous Prod of India *P W D* (1871) 28, Balfour *Cyclop I* 1062 *Treasury of Bot* 478 *Kew Off Guide to Bot Gardens and Arboretum* 115 Home Dept *Cor regarding Pharm Ind* 240 *Bomb Gas, XX* 69

Habitat.—A small tree with round stems and smooth branches A native of Africa but has become naturalized in the drier parts of Bengal the Deccan South India and Ceylon elsewhere it is largely cultivated for hedges and in Berar is much grown to shelter young mango plants from direct sunlight

Gum.—Dr Riddell writing of this plant says that the milk, when it “hardens after boiling becomes brittle, whilst warm it is as ductile as mudar gutta-percha The juice is however very difficult to deal with as it causes excruciating pain if it gets into a cut in the skin or into the eye On this account it is said to be used criminally to destroy the eyes of certain domesticated animals

Dye.—The ASHES are employed in Southern India as a mordant Dr Bidie however states (quoted by Liotard) that it is not properly speaking a dye-yielding plant but that it is burnt and the ashes form an ingredient of the red dye with *chay root* (see *Oldenlandia*.)

Medicine.—The JUICE of this plant is used as a warm remedy in rheumatism tooth ache and debility The MILK is said to cure affections of the spleen and to act as a purgative in colic Externally it is a vesicatory It is also cathartic emetic and antisyphilitic According to Irvine (*Mat Med*) the acrid juice is applied externally to ulcers

SPECIAL OPINIONS.—“A good application in neuralgia” (*Surgeon Major G Y Hunter Karachi*) Fluckiger has separated *Euphorbon* from E. Tirucalli and E. Cattimandoo, it is probably present in the other Indian *Euphorbias* (W Dymock *Bombay*)

Fodder—Goats and camels eat both the leaves and the bark

Structure of the Wood—Attains a height of 20 feet the wood is white, close-grained and strong is used for rafters &c Also used for veneering purposes and for toys “Its wood produces a good charcoal for the manufacture of blasting powder” (*Shuttleworth Conserv Forests Bombay*)

FODDER.
553

GUM
554

DYE
Ashes
555

MEDICINE.
Juice
556

MILK.
557

FODDER.
558
TIMBER
559

**EURYA
symlocina****Catimandoo Cement****DOMESTIC
560**

Domestic Use.—Extensively employed as a hedge plant Dr Lisboa states that in the Southern Marátha country and in Goa the milk is made use of for poisoning fish The Conservator of Forests Southern Circle Madras says that the bark yields a good charcoal which is in great demand amongst the blacksmiths and chunam burners of the Coimbatore District

561

Euphorbia trigona, Haworth, *Fl Br Ind*, V, 256, Wight, Ic, [1863]
Syn —E CATTIMANDOO W Elliot

Vern —Katti mandu (Knife medicine) TER

References —Roxb *Fl Ind Ed C B C* 393 Voigt *Hort Sub Cal* 162 Brandis *For Fl* 438 Beddome *For Man*, 216 Gamble *Man Timb*, 368 Elliot *Fl Andhr* 89 Moodeen Sheriff *Supp Pharm Ind* 137 Drury *U Pl* 204 Balfour *Cyclop I* 1061 Smith *Dic 98 Treasury of Bot* 477

Habitat —An erect glabrous shrub with branches acutely 3 5 winged It inhabits dry rocky hills in the Deccan, and probably other parts of India

**GUM
Milk
562**

Gum —The MILK yields a cement which is largely used by the country people for fixing knives &c into handles and for similar purposes

Fluckiger has obtained from this plant as also from *E Tirucalli*, *Euphorbon* the active principle of the officinal *Euphorbium*, and it is probable that most of the Indian species will yield a gum of the same properties as commercial *Euphorbium* (Dr Dymock)

EURYA, Thunb; Gen Pl, I 183**563**

Eurya acuminata, DC; *Fl Br Ind I* 285, TERNSTREMIACEÆ

Vern —Sanujhngni NEPAL Flotungchoug LEPCHA

References —Brandis *For Fl* 24 Kurs *For Fl Burm I* 1011 Gamble *Man Timb* 28 Thwaites *En Ceylon Pl* 41 Royle *Ill Him Bot* 127 t 25

Habitat —A small evergreen tree or shrub of the hills of the North Eastern Himálaya from Kumaon to Bhotan and Martaban on altitudes of from 3 000 to 8 000 feet

**TIMBER
564**

Structure of the Wood —Differs from that of *E symlocina* in having the larger medullary rays less broad and less prominent Weight 32 to 47 lb per cubic foot

565

E japonica, Thunb; *Fl Br Ind I* 284

Vern —Baunra gonta deura HIND Yhingni NEPAL Tungchung LEPCHA; Baunra gonta, deura BOMB Hoolooni NILGIRIS; Tounklet pet BURM Neya dassé SING

References —Voigt *Hort Sub Cal* 91 Brandis *For Fl* 24; Kurs *For Fl Burm I* 101 Beddome *Fl Sylv t 92 Gamble Man Timb* 28 Thwaites *En Ceylon Pl* 41 Trimen *Hort Zeyl* 7 Atkinson, *Him Dist* 306 Lisboa *U Pl Bomb* 13 Balfour *Cyclop I*, 1064

Habitat —A shrub or small tree found on the Himálaya from the Jumna eastwards above 3 000 feet in altitude it also occurs in the Western Gháts and in Burma

**TIMBER
566**

Structure of the Wood —Brown, soft, close-grained It is sometimes used for fuel

567

E symlocina, Blume *Fl Br Ind I*, 284

Vern —Barajhngni kisi NEPAL; Flotungchoug LEPCHA

References —Kurs *For Fl Burm I*, 102 Gamble *Man Timb* 28

Habitat —A small evergreen tree of the hills of the North Eastern Himálaya from 5 000 to 7 000 feet also found in Burma.

**TIMBER
568**

Structure of the Wood —Reddish white, soft, close grained. Used only for firewood

E 568

The Gorgon Fruit	(F F Duthie)	EUXOLUS.
<p>EURYALE, <i>Salisb</i>, <i>Gen Pl</i>, I, 47</p> <p>Euryale ferox, <i>Salisb</i>, <i>Fl Br Ind</i>, I, 115, <i>Bot Mag</i>, 1447,</p> <p>THE GORGON FRUIT [Nymphaeaceæ</p> <p>Syn.—<i>ANNESLEA SPINOSA</i> Roxb; <i>EURYALE INDICA</i> Planch</p> <p>Vern.—<i>Makhana</i> HIND; <i>Makhana</i> BENG <i>Kunta pudana</i>, URIYA; <i>Jewar</i> PB <i>Mallani padman</i> TEL <i>Padma</i> (?) Nelumbium) U O Dutt gives <i>Makhanna</i> SANS</p> <p>References.—Roxb <i>Fl Ind Ed</i> C B C 427 <i>Voigt Hort Sub Cal</i>, 8 <i>Stewart, Pb Pl</i> 8 <i>Le Maoût and Dexcaisne Descrip & Aynal Bot</i> 212 (Eng Ed) Elliot <i>Fl Andhr</i> 126 O Shaughnessy <i>Beng Dispens</i> 622 U C Dutt <i>Mat Med. Hind</i> 110 308 <i>Dymock Mat Med W</i> <i>Ind 2nd Ed</i> 38, S Arjun <i>Bomb Drugs</i> 7 <i>Drury U Pl</i> 207 <i>Balfour Cyclop I</i> 1064 <i>Smith, Dic</i> 196 <i>Treasury of Bot</i> 479, <i>Kew</i> <i>Off Guide to Bot Gardens and Arboretum</i> 24 57</p> <p>Habitat.—A stemless aquatic plant of the sweet water lakes and ponds of East Bengal Assam Manipur Oudh and Kashmir It is said to have been cultivated in China for upwards of 3000 years It has circular prickly leaves 2 to 3 feet in diameter which float on the surface of the water The flowers are blue violet or bright red and green on the outside The fruits are round and prickly of the size of an orange and on ripening they swell out in various places by the growth of the seeds within</p> <p>Medicine—Roxburgh says that the Hindus "consider the SEED as possessed of powerful medicinal virtues such as restraining seminal gleet invigorating the system &c A light and invigorating food suited for the sick (Dutt)</p> <p>Food—The SEEDS which are black in colour and of the size of peas are farinaceous They are sold in the bazars of Eastern Bengal and eaten by the natives who consider them light and easily digestible They are largely used in Manipur as an article of food the women sitting on the roadsides sell the spiny fruits along with betel nuts <i>singara</i> nuts &c (Watt) Roxburgh describes the process of cooking the seeds which consists in roasting them in hot sand They swell and burst when the seed-coat is easily removeable</p>		
<p>EURYCOMA, <i>Jack Gen Pl</i> I 312</p> <p>Eurycoma longifolia, <i>Jack Fl Br Ind</i>, I, 521 <i>SIMARUBÆ</i></p> <p>Vern.—<i>Penvar pet</i> MALAY</p> <p>References.—<i>Kurz For Fl Burm I</i> 202, <i>Gamble Man Timb</i> 63 <i>Pharm Ind</i> 50 <i>Moodeen Sheriff Supp Pharm Ind</i> 138 <i>Treasury</i> <i>of Bot</i> 479</p> <p>Habitat.—A small tree of the Malayan Peninsula and Archipelago</p> <p>Medicine—The BARK and root of this tree possess bitter properties A decoction of the root is a remedy in intermittent fevers and as a febrile fuge stands in the opinion of Mr Oxley (1850) next to quinine (<i>Pharm</i> <i>Ind</i>)</p>		
<p>EUXOLUS, <i>Raf</i>—an old generic name for the species of <i>Amarantus</i>, see Vol I, p 208.</p>		
<p>The classification of the species under <i>Amarantus</i> in Vol I having been prepared before the publication of Sir Joseph Hooker's monograph of AMARANTACEÆ in Vol IV 718 to 722 of the <i>Flora of British India</i> a revised list of the Indian species with some of the more important syno- nyms and references may be found useful</p>		
<p>* Bracts setaceous or awned exceeding the five sepals Stamens five utricle circumsciss, top 2 to 3-fid.</p>		

EUXOLUS

The Amaranth.

1 *Amarantus spinosus*, Linn Roxb, Fl, Ind Ed CBC 663 Grah, Cat Bomb Pl 169 Dals & Gbs, Bomb Fl 216 Wight Ic t 513 Waste ground throughout India and Ceylon (Sir J D Hooker, in Fl Br Ind IV 78)

2 *A. paniculatus*, Linn Dals & Gbs, Bomb Fl 215 *A. frumentaceus* Ham Roxb Fl Ind Ed CBC 663 Wight Ic t 720 *A. Anardana*, Ham (*A. Anardana*) Cultivated throughout India and Ceylon and up to 9000 feet on the Himálaya Like the following of which it may be a form the seeds vary extraordinarily in size form, and colour (Sir J D Hooker Ic 719)

3 *A. caudatus*, Linn *A. cruentus*, Willd Roxb Fl Ind, El CBC 663 Cultivated in various parts of India I find it very difficult to distinguish some states of this from *A. paniculatus* In its typical state it is a smaller plant with the leaves obtuse at the tip more globose softer masses of smaller red green or white flowers on the thyse the terminal spike of which is very long thick and drooping" (Sir J D Hooker, Ic 719)

* * Bracts subulate equalling or exceeding the three lanceolate sepals and utricle Stamens three utricle circumsciss

4 *A. gangeticus*, Linn Roxb Fl Ind Ed CBC 662 *A. tricolor*, Linn Roxb Ic 663 *A. lanceolatus*, Roxb Ic 662 *A. tristis*, Linn Roxb Ic 661 Grah Cat Bomb Pl, 169 Wight Ic t 713 Dals & Gbs Bomb Fl 215 *A. oleraceus*, Roxb Ic 662 Wight Ic t 715 Thwaites En Ceylon Pl 247 (not of Linnæus) *A. polygamus* Roxb Ic 661 Wight Ic t 714 *A. lividus* Roxb Ic 662 *A. melancholicus*, Linn Roxb Ic 663 Throughout India and Ceylon Cultivated or found on cultivated ground This is Roxburgh's *A. tristis*, and possibly that of Linnæus but the latter describes the leaves as ovate-cordate which these are not Roxburgh says that his *gangeticus* and *oleraceus* differ from his *polygamus* and *tristis* and their varieties in not admitting of being cut for successive crops but being hence unrooted for market (Sir J D Hooker Ic 720)

5 *A. mangostanus*, Linn *A. polygamus* Thw En Ceylon Pl 247 Throughout India and Ceylon in cultivated ground

6 *A. Caturus* Hayne Deccan Peninsula (Sir J D Hooker Ic 720)

* * * Bracts usually shorter than the two or three sepals and utricle stamens two or three utricle indehiscent or circumsciss

7 *A. viridis*, Linn Roxb Fl Ind Ed CBC 661 Grah Cat Bomb Pl 169 *A. fasciatus*, Roxb Ic 663 Wight Ic t 717 *Euxolus caudatus*, Moq Wight Ic t 1773 Waste places throughout India *A. fasciatus* Roxb is a sport with a pale crescentic band across the leaf (Sir J D Hooker Ic 721)

8 *A. Blitum*, Linn (Sir J D Hooker Ic 721)

Var—*A. oleraceus* Linn *E. oleraceus*, Dals & Gbs, Bomb Fl, 216 Cultivated in India and elsewhere

Var—*A. sylvestris*, Desf Kashmir 4000 to 6000 feet (Thomson)

9. *A. polygamus* Linn (not of Roxburgh) Thwaites En Ceylon Pl, 247 *A. polygonoides* Roxb Fl Ind Ed CBC 661 Wight Ic, t 512 719 *Amblogyna polygonoides*, Dals & Gbs Bomb Fl 219 *Euxolus polygamus*, Moq Thwaites En Ceylon Pl 248 Throughout India and Ceylon I believe that this can only be ranked as a form of *A. Blitum*, with small usually abovate apiculate leaves fewer flowers in a cluster, often larger more subulate sepals and smaller more acute utricles."

Var—*angustifolia*. Occurs in the Panjáb and Carnatic

The Evolvulus		(F F Duthse)	EVOLVULUS alsinoides.
10. <i>A. tenuifolius</i> , Willd. <i>Roxb Fl Ind</i> , Ed C B C, 660 <i>Wight Ic</i> , t 718 <i>Menges tenuifolia</i> , Moq. <i>Dals & Gibs Bomb Fl</i> 218 Bengal Gangetic Valley and Panjáb (Sir F D Hooker, l c 722)			
EVODIA, Forst <i>Gen Pl</i> , I, 296			
Evodia fraxinifolia, Hook f; <i>Fl Br Ind</i> , I, 490, RUTACEÆ			575
Vern.— <i>Kanuka</i> NEPAL; <i>Kanu</i> LEPCHA Reference — <i>Gamble Man Timb</i> 60			
Habitat.—A small tree of the Eastern Himálaya in Sikkim, between 4 000 and 7 000 feet and of the Khasia Hills from 3 000 to 5 000 feet. It is said to emit a strong scent of caraway when bruised.			
Structure of the Wood — White soft, used only for posts of huts			
E. Roxburghiana, Benth, <i>Fl Br Ind</i> I 487 <i>Wight, Ic</i> , t 204			TIMBER 576 577
Syn.— <i>E. triphylla</i> Beddome. <i>FAKARA triphylla</i> ROXB. <i>ZANTHOXYLUM triphyllum</i> Thwaites			
Vern.— <i>Nebede lunu ankenda</i> SING			
References — <i>Roxb Fl Ind</i> Ed C B C 139 <i>Kurz For Fl Burm</i> I 180 <i>Gamble Man Timb</i> 60 <i>Thwaites En Ceylon Pl</i> 69 & 409, <i>Dals and Gibs Bomb Fl</i> 45 <i>Grah Cat Bomb Pl</i> 36 <i>Lisboa U Pl Bomb</i> 30			
Habitat — A small tree found in the Khásia Hills, South India, Tenasserim and the Andaman Islands, also met with in Ceylon.			
Structure of the Wood — Greyish brown, moderately hard			
E. triphylla, DC. <i>Fl Br Ind</i> I, 488			TIMBER 578 579
References — <i>Kurz For Fl Burm</i> I 180 <i>Gamble Man Timb</i> 60			
Habitat — A small tree much resembling <i>E. Roxburghiana</i> . It inhabits damp localities in Burma and the Andaman Islands, Japan, China and Borneo.			
Structure of the Wood — 'Light soft pale-pinkish close-grained, straight fibrous with silvery lustre' (<i>Gamble</i>)			
EVOLVULUS, Linn <i>Gen Pl</i> II, 875			
Evolvulus alsinoides, Linn; <i>Fl Br Ind</i> , IV 220 CONVOLVU			581
[LACEÆ			
Syn.— <i>E. hirsutus</i> Lam. <i>E. angustifolius</i> Roxb.			
Vern.— <i>Tundi hode-baha</i> SANTAL. <i>Sankhpushpi</i> PB; <i>Shankhdavali</i> , BOMB. <i>Vishnu karandi</i> TAM. <i>Vishnu kranti</i> TEL. <i>Vishnu kranti</i> KAN. <i>Vishnu kraanti</i> SING. <i>Vishnugandhi</i> SANS.			
References — <i>Roxb Fl Ind</i> Ed C B C 276 <i>Voigt Hort Sub Cal</i> 363 <i>Thwaites En Ceylon Pl</i> 213, <i>Dals & Gibs Bomb Fl</i> 162 <i>Stewart Pb Pl</i> 150; <i>Fillot Fl Andhr</i> 128 193 <i>Rheede Hort Mal XII</i> t 64; <i>Dymock Mat Med W Ind</i> , 2nd Ed 564 <i>S. Arjun Bomb Drugs</i> 94 <i>Bidie Cat Raw Pr Paris Exh</i> 56 <i>Atkinson Him Dist</i> 314 <i>Balfour Cyclop</i> I 1067			
Habitat.—A prostrate perennial herb with wiry stems and blue or white flowers, found nearly all over India on dryish ground.			
Medicine.—Muhammadan physicians believe that this PLANT has the power of strengthening the brain and memory. It is also extensively used as a febrifuge and tonic. Ainslie says that it is given in bowel complaints. In the Vedic period it was believed to possess the power of promoting conception (<i>Dymock</i>).			
SPECIAL OPINIONS — § "The roots used in intermittent fever of children" (<i>Rev A Campbell</i>). 'The leaves are made into cigarettes and smoked in chronic bronchitis and asthma. The plant is astringent, useful in internal hæmorrhages' (<i>Surgeon Major F M Hunston Travancore and John Gomes Medical Storekeeper Travandrum</i>). 'The blue-coloured			
x			Roots. 583 Leaves. 584
			E 584

EXCÆCARIA
Agallocha

The Blinding Tree; Churetta Substitute

flowered form is called *Vishnugrandis*. The other kind has white flowers and is called *Sivagrandis*. (*V Ummagudisem, Mettapolitan Madras*)

EXACUM, Linn Gen Pl II, 803

585

Exacum bicolor, Roxb Fl Br Ind, IV, 96 Wight Ic, t 1321Vern — *Barā chadyatak* HIND

[GENTIANACEÆ

References — Roxb Cat Pl (1813) Dals & Gibs Bomb Fl 156
(Syn excl) Dymock, Mat Med W Ind 2nd Ed 540 Drury U Pl
208 Lisboa U Pl Bomb 262 Balfour Cyclop I 1067 Clarke in
Journ Linn Soc XIV 425

Habitat — An erect herbaceous plant 1 to 2 feet high, frequent in the Deccan Peninsula. Flowers large white tipped with blue

MEDICINE

Stalks

586

Medicine — The dried STALKS are sold in South India under the name Country Kariyat. The plant possesses tonic and stomachic properties and may well be substituted for *Gentian* (*Pharm Ind*)

587

E pedunculatum, Linn Fl Br Ind, IV, 97 Wight, Ic t 336Syn — *E SULCATUM* Roxb

References — Roxb Fl Ind Ed CBC 134 Voigt Hort Sub Cal
520 Thwaites Enum Ceylon Pl 203 Pharm Ind 150 Drury
U Pl 209 Clarke in Journ Linn Soc XIV 427 Edgeworth Cat
Pl Banda 51 (*E rivulare*)

Habitat — A small herb usually under a foot in height found throughout India ascending to 3 000 feet from Oudh and Bengal to Ceylon

MEDICINE

Plant

588

589

Medicine — The PLANT is less bitter than *Churetta* and more so than *Gentian* for which it may be substituted

E tetragonum, Roxb, Fl Br Ind IV 95Vern — *Titakhana ava* (purple) *churetta* HIND Koochuri BENG

References — Roxb Fl Ind Ed CBC 133 Voigt Hort Sub Cal
520 Grah Cat Bomb Pl 123 Royle Ill Him Bot I 277 Pharm
Ind 149 O'Shaughnessy Beng Dispens 460, Irvine Mat Med
Patna 81 Balfour Cyclop I 1067 Clarke in Journ Linn Soc
XIV 424

Habitat. — An erect herbaceous plant 1 to 4 feet high with deep-blue flowers found in North India ascending to 5 000 feet common from Garhwāl to Central India Bhutān and the Khāsia Mountains also in Bombay Salsette Khandalla Morung Wurgaum and Bengal

MEDICINE

590

Medicine. — The plant is used as a tonic in fevers and a stomachic bitter (*Pharm Ind*)

EXCÆCARIA, Linn Gen Pl, III 337

The name is said to be derived from *Excæco* because of the powerfully acrid juice especially that of **E Agallocha**, which causes blindness if applied to the eyes

591

Excæcaria acerifolia, Didrichs, Fl Br Ind V, 473; EUPHORBIACEÆVern — *Bāsingh* KUMAON

References — Brandis For Fl 441 Ind For XI 5

Habitat — An evergreen shrub or small tree found up to 6 000 feet in Kumāon Nepāl and on the Khāsia Hills

MEDICINE

Leaves,

592

593

Medicine — The Bhutias inhabiting East Kumāon use the LEAVES of this plant as a remedy for rheumatism

E Agallocha, Linn Fl Br Ind, V, 472; Wight, Ic, t 1865 B

THE BLINDING TREE

Vern — *Gangwa geor uguru geria goria* BENG; *Gnua URIYA*; *Geva BOMB* *Chilla tella-chettu* TEL *Haro KAN*; *Tayan, hayau, BURM*; *Yekin, ANDAMANS*; *Tella kwya, SING*

E. 593

The Blinding Tree.

(F F Dutrie)

**EXOCONIUM
Purga.**

References — Roxb *Fl Ind Ed C B C* 713 Voigt *Hort Sub Cal* 161 Brandis *For Fl* 442 Kuhn *For Fl Burm.* II 414, Beddome, *For Man* 255 Gamble, *Man Yimb* 368, Dals & Gibs *Bomb Fl* 227 Rheede *Hort Mal V t* 45; Elliot *Fl Andhr* 173 Rumph *Amb II t* 79 80 (*Arbor excoecans*) Ainslie, *Mat Ind II* 438 O'Shaughnessy *Beng Dispens*, 563 Dymock, *Mat Med W Ind 2nd Ed* 676 Drury *U Pl*, 209 Lisboa *U Pl Bomb* 125 Birdwood *Bomb Pr* 345 Balfour *Cyclop I* 1067 Smith *Disc*, 5, *Treasury of Bot*, 483 *Kew Reports* (1877) 42 Mason *Burma and Its People* 762 *Bomb Gas XV* 443

Habitat.—A small evergreen tree of the Coast and tidal forests of India, Burma, and the Andaman Islands. The famous *Agallochum* or *Aloes* of the Old and New Testament formerly supposed to be the product of this tree is yielded by *Aquilaria Agallocha*, which belongs to an entirely different family the *THYMELACEÆ*. See Vol. I, p 279.

Gum—The wood contains a poisonous sap which hardens into a black caoutchouc-like substance. The fresh sap is extremely acrid and causes intolerable pain if it accidentally gets into the eyes and which sometimes happens to the woodcutters when the tree is cut for fuel hence "says Balfour, 'Rumphins name *Excoecans*'. The Conservator of Forests Southern Circle, Madras writes that a species supposed to be this one is known in Travancore as the Tiger's milk tree it blisters the skin and the juice coagulates when stirred.

Medicine.—In Fiji it is employed for the cure of leprosy its mode of application being very singular. The body of the patient is first rubbed with green leaves he is then placed in a small room and bound hand and foot, when a small fire is made of pieces of the wood of this tree from which rises a thick smoke the patient is suspended over this fire and remains for some hours in the midst of the poisonous smoke and under the most agonizing torture often fainting. When thoroughly smoked he is removed and the slime is scraped from his body he is then scarified and left to await the result. In some cases he is cured but frequently the patient dies under the ordeal (*Smith Econ Dic* 5).

Structure of the Wood—White very soft and spongy. Grows occasionally to 5 feet in girth and 40 feet in height though generally cut for posts when of small girth. It is a useful wood for general carpentry purposes such as toys, bedsteads, tables &c. Roxburgh remarks that it is only used for charcoal and firewood.

Domestic Use—Fishing floats are made from the roots of the tree.

E baccata, Mull Arg see *Sapium baccatum*

E indica, Mull Arg see *Sapium indicum*

E insignis, Mull Arg, see *Sapium insigne*

E sebifera, Mull Arg see *Sapium sebiferum*.

Exogonium Purga, Benth, see *Ipomœa Purga*

GUM
594

MEDICINE
595

TIMBER.
596

DOMESTI
597

FAGONIA
arabicaThe Field or Broad Bean **Fagonia.**

(G Watt)

FABA, *Tourn ; Gen Pl, I, 325***I****Faba vulgaris**, *Manch*, **LEGUMINOSÆ****THE BROAD BEAN****Vern.**—*Káinn* KASHMIR *Chastang* SUTLEJ *Nakshan* LADAK *Bákla*
a name given to it in the plains and lower hills of India

Habitat and Area of Indian Cultivation.—The *Flora of British India* does not allude to this plant from which fact the inference is unavoidable that it is not regarded as a native of India. But introduced cultivated plants are usually described in the *Flora* and the absence of any notice of the Field or Broad Bean may be assumed as an indication that it is supposed to be scarcely if at all cultivated in this country. It is however to a considerable extent cultivated on the *Himálaya* and in Kashmir and Ladak may be regarded as a regular crop. *De Candolle* says it has no Sanskrit name nor any modern Indian name. From this circumstance he infers that it is of modern introduction into India. The vernacular names given above would however seem opposed to this opinion. *Mr Atkinson* states that it is cultivated in *Kumáon* up to 8 000 feet and that there are two or three varieties raised from introduced and native seed. *Mr Baden Powell* refers to its cultivation in Kashmir and Peshawar. *Balfour* goes even still further and affirms that it is found wild in the *Sutlej* valley between *Rampur* and *Sungnam* at an elevation of 8 000 to 14 000 feet. *Stewart* while not supporting the verdict that it is a native of the *Sutlej* valley speaks of it as a regular crop adding that beans are ground into flour for food and are on the *Sutlej* given to cattle. In the *Settlement Report of the Kángra District* it is alluded to as a regular spring crop. The *Director of Land Records and Agriculture in Bengal* replying to an enquiry regarding this plant reports that it is not yet grown as a field crop in the *Lower Provinces*. The *Director in Burma* on the other hand states that in *Pegu District* it is cultivated by the Chinese and Shan gardeners in moderate quantities but has not been taken up as a field crop. This vegetable finds a ready sale in the market. The plant is said to thrive on any land which can be cultivated during the dry season. In the *Indian Forester* (*Vol IX p 452*) will be found an interesting note on its cultivation in the *North West Provinces*. See also in the *Fours Agr Hort Soc IV 7 V 37*.

For further information consult the article **Vicia**.**FAGONIA**, *Linn ; Gen Pl I 267*

A genus of branching woody herbs of so variable a nature that it is difficult to fix the number of species. Two occur in India—one in the *North West* to *Peshawar* distributed to *Algeria* the other also occurs over *Northern India* but shows in *India* a more westerly tendency being dispersed through the *Panjab* and *Sind* to *Bombay*. It is often difficult to determine to which of these species writers on *Economic Botany* allude and the statements made below may therefore have to be rearranged in the future.

2**Fagonia arabica**, *Linn Fl Br Ind I 425* **ZYGOPHYLLÆ****Syn**—**FAGONIA MYSORENSIS** *Roth Wall Cat, 6853* **F CRETICA**
var ARABICA *Dals & Gibs***Vern**—*Usturgar* *ustarkhar* **HIND** *Jowasa* (*Ajmere*) **RAJ** *Drum mahá* (or *drammaho*) **SIND** *Dhamásá dumasó* **MAR** *Dhamasó*
Guz *Dusparsha* **SANS** *Báddvārd* **PERS****References**—*Dals & Gibs Bomb Fl 45* *Aitchison Cat Pb and Sind Pl 27* *Aitchison's Report Del Com Afg 44, Pharmacog Ind I 246* *Dymock Mat Med W Ind, 2nd Ed 120* *S Arjun Bomb Drugs 27* *Murray Pl and Drugs, Sind 91, Baden Powell Pb Pr 335* *Stocks, Account of Sind, List of Drugs exhibited by Bádoda Durbar***F 2**

The Buckwheats.

(G Watt)

FAGOPYRUM
cymosum

at Cal Inter Exh, *Gazetteers Mysore and Coorg* I 56; *Agra* IV, LXIX, *Ind For XII* (App) 2 8

Habitat—Throughout North West India Sind the Panjáb, and the southern provinces of the Western Peninsula. Spines shorter than the linear leaflets

Medicine—Dr Stocks was the first writer apparently who made the medicinal properties of this plant known to Europeans. He says The LEAVES and TWIGS are supposed to have cooling properties and according to the Arabian system of medicine must be good against all disorders arising from heat (external and internal). They are much used as preventatives in the hot weather to keep the system cool and ward off disorders incident to that season. The authors of the *Pharmacographia Indica* write that it is used in Sind and Afghanistan as a popular remedy for fever among the hill people. Many writers allude to the reputation which the leaves possess as an external application to abscess from thorns. Dalzell and Gibson believed this to be fanciful but in the report on the Baroda drugs shown at the Calcutta International Exhibition the plant is said to have a great reputation as a suppurative in cases of abscesses from thorns. An infusion is used as a gargle in sore mouth. Dr Dymock refers to the property of a suppurative in equally strong terms adding however that it is also used for cooling the mouth in stomatitis the JUICE being boiled with sugar-candy until quite thick and a small quantity allowed to dissolve in the mouth frequently the juice is thought to prevent suppuration when applied to open wounds. Mr Sakharan Arjun remarks that Mr Rahim Khan only mentions that this drug purifies the blood and acts as a deobstruent. Mr Arjun adds (of *F. mysorensis*) that it is largely used by the native practitioners as a bitter and astringent tonic.

MEDICINE.
Leaves.3
TWIGS.
4Juice.
5**Fagonia Bruguieri, DC Fl Br Ind I, 425**

Syn—*F. CRETICA* var. ? T Anders

Vern—*Damāhun* (or *dam dhar*=carried by the wind) HIND *Spalaghshd aghsa*; TRANS INDUS *Dhamd* (or *dhāmāh*) *damā damsyā dramah dhaman* PB and SIND; *Dhamaso* GUZ *Bodawurd* (=carried by the wind) PERS

References—*Stewart Pb Pl* 37 *Baden Powell Pb Pr* 335 *Settl Rep Montgomery* 20 *Gas Munaffgarh* 27 *Gas Agra (IV)* LXIX

Habitat—Found in North West India to Peshawar and distributed westward to Algeria. Spines exceeding the ovate leaflets.

Medicine—The PLANT is given as a febrifuge and tonic and Bellow states that in the Peshawar valley it is administered to children as a prophylactic against small pox (J L Stewart). Baden Powell writes that it is useful as an application to tumours also in chronic fever dropsy and delirium and in any disorder which arises from poisoning.

[A No 1665 SALVADORACEÆ

F montana, Miq, see *Azima tetracantha*, *Lam Dic Econ Prod Vol I*

FAGOPYRUM, Gärtn Gen Pl III, 99

Fagopyrum cymosum, Meissn Fl Br Ind, V, 55; POLYGONACEÆ

Syn—*FAGOPYRUM TRIANGULARE* Meissn *F EMARGINATUM* var *KUNAWARENSE* Meissn *POLYGONUM CYMOSUM* *Treviran*; *P not TRIANGULARE* Wall *P EMARGINATUM* Wall, *P DIBOIRYS* Don *P VOLUBILE* Turcz *P RUGOSUM* Ham

Vern—*Banogal* (Sutlej Valley) PB

References—*Stewart Pb Pl* 183 *Atkinson Hem Dist* 316

Habitat—A tall delicately-branched annual growing on perennial roots. This appears to be the wild plant from which perhaps both, or at least one

MEDICINE
Plant.

7

8

**FAGOPYRUM
esculentum****The Buckwheats****FOOD
9**

of the species of BUCKWHEAT has been derived. It occurs on the temperate Himálaya frequenting glades between 5 000 and 11 000 feet in altitude. It is distributed from Kashmir to Sikkim and the Khásia Hills. Mr Atkinson calls this the *ban* (wild) -*ogal* and adds that in Kumáon it occurs wild on the lower hills.

Food and Fodder—Although eaten as fodder by cattle it is commonly reported that this species is not used for any economic purpose. It is however so much like *F. esculentum* that it is often doubtful when in flower whether the plants met with in glades near fields are truly wild or only escapes from cultivation.

10**Fagopyrum esculentum, Manch, Fl Br Ind V, 55****THE BUCKWHEAT OF BRANK**

Syn—*FAGOPYRUM EMARGINATUM* Meissn. *POLYGONUM FAGOPYRUM* Linn. *P. DIOICUM* Ham. *MS. P. EMARGINATUM* Roth.

Vern—*Phaphra kotu kálu* HIND. *Doron ASSAM*. *Titaphapur* [Darjiling]. *NEPAL*; *Bhe palti* BHUTIA. *Kotu* GARHWAL. *Pháphar ogul* KUMAON. *Dardú obal phulan ogal pháphar* PB. *Phaphra ugla pagua hathu dhanphari*, SIMLA. *Bares katu* KANGRA; *Kathu, brés* KULLU. *Tramba shirin* KASHMIR.

See the note on the vernacular names of *F. TATARICUM*.

References—*O. Shaughnessy* Beng. *Dispens.*, 523. *Church on Food grains of Ind.* 114. *Baden Powell* Pb. Pr. 244. *Atkinson Him. Dist.* 698. *McCann Dyes and Tans* Beng. 143. *Crookes Handbook Dyeing and Calico Printing* 412. *Report Nilghiri Hills* by W. R. Robertson 22. *Smith, Disc.* 67. *Settle Report of Simla* [App.] XLI. *Settle Report Kumáon* [App.] 32nd. *Settle Report Kangra* 25. *Assam—Note on Condition of the People of* W. R. Robertson in *Report, Agri. Dept. Madras* 1878 pp. 136–137. *Gazetteers Kangra* I 153. II 57; *Mysore and Coorg* I 65.

Habitat—Extensively cultivated on the Himálaya from Western Tibet to Sikkim, the Khásia Hills, Manipur and the Nilghiri Hills.

There would appear to be many very distinct varieties, some with white others with pink flowers. All are more robust and stunted than *F. cymosum* but it seems probable that every intermediate condition exists between these two species. A form occurs which seems to correspond to the *F. emarginatum* as described by Stewart but the writer not having the opportunity of studying specimens of the various cultivated plants can do no more than suggest the necessity for such a study. When finally determined the vernacular synonyms will have to be rearranged. Indeed so confused are the names given to the forms of Buckwheat that it is impossible to assign distinctive vernacular terms for two so widely different plants as *F. esculentum* and *F. tataricum*. The latter is a much coarser plant grows at higher altitudes and the nut has the angles rounded off instead of being sharp.

**CULTIVATION
II**

Cultivation—On the Himálaya between 4 000 and 10 000 feet *F. esculentum* is a rainy season crop being sown in July and reaped in October. The forms met with at lower elevations are stunted and have thick swollen stems of a red shining colour, with pink flowers. In experimental cultivation at the Saidapet Farm, Madras, Buckwheat from Australian seed was sown on the 9th November; it was irrigated several times and yielded on the 21st January 167 lb of grain and 1 138 lb of straw per acre. But Mr Robertson did not apparently form a favourable opinion of Buckwheat as an auxiliary corn-crop. We have he adds 'several indigenous grain and pulse crops equal for ordinary cultivation to the Buckwheat if only the ryots could be induced to manure and cultivate better.' Mr Atkinson speaking of Kumáon and Garhwál says that Buckwheat 'is grown chiefly as a vegetable in the hills and is

F. II

The Buckwheats—Kotu

(G Watt)

FAGOPYRUM
tataricum

recognisable by its red flowers. It is frequently sown in newly-cleared forest lands and ripens in September. The grain is exported to the plains under the name *Kotu* and is eaten by the Hindus during their fasts (*bart*) being one of the *phalāhas* or food grains lawful for fast-days. It is said to be heating but palatable and is sold by the *pansāri* or druggists, and not by the general grain dealers. Stewart remarks under *F. emarginatum* that he thinks there are at least three cultivated species in the Panjāb Himālaya. This with reddish flowers is generally said to grow lower than the other but I have seen both at the same level about 8500 feet on the Sutlej. The leaves of this are used as a pot herb. Speaking of the Nilghiri Hills Mr Robertson says 'I did not see any crops of this plant but I was informed that Buckwheat grows readily and produces heavily even on exposed parts of the higher portions of the plateau near Ootacamund.' 'Its flour from decorticated seeds is white and wholesome.'

Dye.—Dr McOann mentions having received from Darjiling a 'sample of woollen yarn dyed a light purple by *tilaphapur* (Buckwheat) and *manjistha*. A specimen of the plant *tilaphapur* alluded to was identified at the Royal Botanic Gardens as *F. esculentum*. Crookes gives an abstract of Schunck's results obtained on chemically examining Buckwheat. A yellow crystalline colouring matter may be extracted from the leaves identical with *rutin* and also with *ilixanthin*. This dye yields on mordanted cotton bright yellow shades. It may be obtained by adding acetate of lead to a decoction of the leaves filtering while hot and adding acetic acid when the yellow crystals will be precipitated.

Food.—The LEAVES and tender SHOOTS are boiled as a spinach and the NUTS are husked and ground into flour which is eaten as bread. The unhusked nuts are regarded as a superior food for poultry. As an article of human food Buckwheat does not hold a high place. About 20 per cent of the weight is lost in the process of decortication. Professor Church publishes the analysis of what would appear to have been an ordinary sample of Buckwheat but not of Indian origin. The table given by the Professor may be here reproduced but it would seem desirable to have authentic samples of the Indian grain subjected to chemical examination—

	In 100 parts	In 1 lb	
Water	13.4	2 oz	63 grains
Albuminoids	15.2	2	189
Starch	63.6	10	77
Oil	3.4	0	238
Fibre	2.1	0	147
Ash	2.3	0	161

From this result Professor Church concludes that the nutrient ratio is 1:4.7 and the nutrient value 86.

Mr Baden Powell says 'The seeds yield a hard bitter and unpalatable BREAD which is said to be heating. It is only eaten in the plains during the *bart* or fast days.'

Fagopyrum tataricum, Gärtn. Fl. Br. Ind. V, 55

Syn.—*F. ROTUNDATUM* Bab. POLYGONUM TATARICUM Linn.Vern.—Kaspat [bazar name] HIND. *Kāla trumba* chin. *karma bres* hótiú brápú drawo phaphra ulgo ugāl tsábri háthú PB; Tráo rjao LADAK.

Note.—On the lower Himālaya it would appear the name *Ogal* or *Ugal* is practically restricted to this species, and *phaphra* given to *F. esculentum*.

References.—Stewart Ph. Pl., 184; Atkinson, Him. Dist., 216, 698; Church Food Grains of India, 114.

Habitat.—Cultivated throughout the higher Himālaya but more

CULTIVATION

Phalahas.
12Pot-herb.
13DYE.
14FOOD
Leaves
15
Shoots
16
Nuts
17Bread
18
19

**FAGRÆA
obovata****The Fagras.****CULTIVA
TION**
20**FOOD**
Nuts
21**Leaves.**
22

23

MEDICINE
Bark
24**TIMBER**
25**SACRED
USES**
26

27

TIMBER.
28

especially on the western extremity and at altitudes from 8,000 to 14,000 feet. It is a taller much coarser plant than *F. esculentum*, and the nuts which are long and not triangular, have the angles rounded off and keeled towards the top. It seems probable that there are several varieties, the nut in some being less than half the size in others.

Cultivation—This seems to be the form grown in Ladak, Zaskar, and Western Tibet. In the Simla neighbourhood it is never seen below 9,000 feet.

Food—There seems to be little or no difference in taste between this and the previously described species. Stewart says however that if any thing this is inferior in point of quality. Bears are said to be more fond of it than almost of any other food and they commit much damage to the standing crop. In Lahoul Aitchison states that the LEAVES are much used as a pot herb in summer when other greens are not easily got.

Professor Church writes: 'An imperfect chemical analysis of the fruits or unhusked seeds of the present species shows it to resemble very closely the common kind cultivated in Europe, the albumenoids being 10.9 per cent, the oil 2.4 and the ash .7; he adds the percentage of albumenoids and oil would be considerably raised by the removal of the husk.'

FAGRÆA, Thunb. ; Gen. Pl. II, 794**Fagras fragrans, Roxb. Fl. Br. Ind., IV 85 LOGANIACEÆ****Vern.**—*Anan* (or *a nan*) BURM.

References—*Roxb. Fl. Ind. Ed. Carey & Wall II 32 Kurr. For. Fl. Burm. II 205 Gamble Man. Timb. 27 Mason Burma and Its People 543 802 Pharm. Ind. 146; Moodeen Sheriff Suppl. Pharm. Ind. 138*

Habitat—A small evergreen tree of Burma and the Andaman Islands to China.

Medicine—The BARK of this plant is said to be a remedy for malarious fever. In experiments made by Dr. Kanny Lal De OIE it was found to contain strychnia. The *Pharmacopœia of India* remarks the remedy appears worthy of further investigation.

Structure of the Wood—Hard, brown close-grained beautifully mottled. It is very durable and is not liable to the attacks of the 'Teredo'. It is one of the most important of the reserved trees of Burma especially in Tavoy and is used for house building, bridge and wharf piles, boat anchors and other purposes. Weight from 53 to 70 lb a cubic foot.

Sacred Uses—The Burmese regard the wood of this tree as too good for the laity and hold that it should be reserved for sacerdotal purposes. At Tavoy it is employed principally for the posts of Buddhist edifices (*Mason*).

F. obovata, Wall. Wight Ic. t. 1316 1317 Fl. Br. Ind. IV 83**Vern.**—*Sunakhari* NEPAL *Longsoma*, MAGH *Nyounghyap* (nyau'ig gyat) BURM.

References—*Kurr. For. Fl. Burm. II 205 Gamble Man. Timb. 267; Thwaites En. Ceylon Fl. 200 Rheede Hort. Mal. 4 tab. 58 Indian Forester II 25 X 34 Bombay Gazetteer (Kánara) XV Pt. I 438*

Habitat—An evergreen tree often scandent or stem-clasping found in the forests of the Deccan Peninsula and in Northern and Eastern Bengal, the Khásia Hills, Chittagong and Burma.

In Burma it is said to be characteristic of the lower hills and it is also reported to be one of the most beautiful plants found on the lower slopes of the Nilghiris. It is common in the forests of North Kánara, flowering during the rainy season. In Burma the fruit ripens in the cold season.

Structure of the Wood—Hard and durable. Weight 56 lb.

Famine Foods	FAMINE Foods
<p>Fagraea racemosa, Jack <i>Fl Br Ind, IV, 84</i> Vern.—<i>Thit hpaloo</i> BURM References—<i>Kurs For Fl Burm II 205 Gamble Man Tsimb 268</i> Habitat—A moderate-sized evergreen tree frequent in the forests of the Andaman Islands and distributed to Penang and Malacca. It flowers and fruits from February to May Medicine—Major Ford says that the ROOT BARK is used as a cure for fever (<i>Gamble</i>) Structure of the Wood—Moderately hard greasy to the touch and with a scent like that of india rubber Weight 50lb per cubic foot Major Ford remarks that it is strong and durable and that the wood is used for house-posts</p>	<p>29</p> <p>MEDICINE- Root-Bark 30 TIMBER, 31</p>
<p>Fagus sylvatica, the BEECH not indigenous to India</p>	
<p style="text-align: center;">FAMINE FOODS</p> <p>The following are some of the more important articles reported to have been eaten in times of SCARCITY AND FAMINE Those marked <i>Dec Fam</i> (=Deccan Famine of 1877-78) are taken from Dr Dymock's list appended to his <i>Mat Med of Western India</i> But the Famine Commission's Report Dr Shortt's special list of Madras Famine Foods and numerous other works have also been drawn upon in compiling the enumeration here given The literature of famine food materials appears to have been more carefully investigated in Bombay than in any other part of India and it seems probable that future enquiry may more than double the number of plants which have been eaten or which might with safety be recommended to be eaten in times of scarcity or famine The reader is referred to their respective alphabetical places for full particulars regarding these famine foods It is commonly stated that the low caste people have a superabundance of food during famines since they eat the animals that have died of starvation The higher-caste Hindus will not do so but prefer rather to die</p> <p>Abrus precatorius—The <i>Rat's</i> seeds These are poisonous if a powder prepared from them be injected under the skin but boiled as a pulse they are wholesome and in Egypt are regularly cultivated as an article of diet</p> <p>Abutilon indicum.—<i>Behar Famine</i> A. muticum—Seeds <i>Dec Fam</i> see also <i>Lisboa U P B p 194</i> Acacia arabica.—Seeds <i>Dec Fam</i> see <i>Lisboa U P B p 199</i> The gum and powdered bark are also largely eaten in famine A. leucophloea.—Bark ground into flour and young pods <i>Brandis</i> Acalypha indica.—Leaves <i>Lisboa U P B p 204 Shortt Ind For III 235</i> Achyranthes aspera Leaves and seeds <i>D c Fam</i> See also <i>Lisboa U P B p 203 Shortt Ind For III 235</i> Adansonia digitata.—Bark and leaves eaten in Senegal Adenanthera pavonina.—Leaves eaten in Orissa Famine Aerua lanata.—Seeds—<i>D c Fam Shortt Ind For III 235</i> Ægle Marmelos—Fruit <i>Dec Fam</i> Æschynomene aspera Leaflets <i>Lisboa U P B 198</i> (Not found on the Bombay side but grows in Bengal) <i>Shortt Ind For, III, 235</i> Æsculus indica.—Nuts <i>Drury U P 334</i> Agave americana.—} The flowering stalks <i>Lisboa U P B, p 205</i> A. vivipara.—} Alangium decapetalum.—Fruit <i>Der Fam</i> Allophylus Cobbe (<i>Schmudela</i>)—Fruit, <i>Shortt Ind For III, 238</i></p>	<p>32</p>

**FAMINE
Foods.****Famine Foods**

- Albizzia procera*.—*Lisboa* U P B p 199
Aloe vera, var *officinalis*.—Leaves *Shortt Ind For III*, 235
A indica.— } The leaf—bud or cabbage *Lisboa*, U P B, p 206
A litoralis.— }
Alpina Galanga.—Tubers *Dec Fam*
Altenanthera sessilis.—Leaves *Shortt Ind For III*, 235
Alysicarpus rugosus.—Seeds *Lisboa* U P B p 198
A vaginalis.—Herb *Dec Fam*
Amarantus gangeticus (*A tristis*).—Herb *Shortt, Ind For III* 235
A oleraceus.—Herb *Dec Fam*
A paniculatus.—Herb *Shortt Ind For III* 235
A spinosus.—Leaves *Bengal Famine Shortt Ind For III* 235
Amorphophallus campanulatus.—Tuber *Lisboa*, U P B p 207 *Shortt Ind For III* 235
A sylvaticus.—Tuber and leaf *Dec Fam*
Andropogon pertusus.—One of the best grasses to withstand long droughts hence a cattle-famine fodder though largely eaten at other times
Anthocephalus Cadamba.—Fruit *Dec Fam*
Arisema curvatum.—Roots *Lisboa* U P B p 207
Arthrocnemum indicum.—Herb pickled *Dec Fam Shortt Ind For III* 238
Arundinaria Wightiana *Lisboa* U P B p 209 Rice from the flowering stem formed the principal food of the poor during the famine of Orissa in 1812 of Kánara in 1864 and of Malda 1866
Asparagus sarmentosus.—Roots *Dec Fam*
Asphodelus fistulosus.—The Piazí the tubers of which are in the Panjáb eaten in times of scarcity *Stewart* says this appears to have been the plant alluded to by Griffith as eaten by the camp followers of the Kan dahar Force when provisions ran scarce
Asterocantha longifolia.—Herb *Dec Fam*
Asystasia gangetica.—Vegetable *Lisboa* U P B p 202
Atriplex hortensis.—Herb *Shortt Ind For III* 235
Bamboo seeds.—Saved thousands in the Orissa Famine of 1812 Kánara of 1864 when 50 000 people went to Dharwar and Belgaum to collect the seeds Malda of 1866 &c &c
Bambusa arundinacea.—Seeds *Dict Ec Prod Vol I* p 391
B vulgaris.—*Lisboa* U P B p 209
Bassia latifolia.—Fruit and also flowers when dried in the sun are eaten normally by the hill tribes but in times of scarcity by all classes *Shortt Ind For III* 235 *Lisboa* writes — During the famine of 1873 74 in Behar this is said to have kept thousands of people from starvation
B longifolia.—Seeds and flowers *Lisboa* U P B p 201
Bauhinia malabarica.—Leaves *Dec Fam* Largely eaten as a vegetable by the hill tribes
B racemosa.—Flowers *Dec Fam*
Betula acuminata.—The inner bark is eaten by the Lahupás of Manipur *Dict Ec Prod Vol I* 451
Borhaavia diffusa.—Herb *Dec Fam* *Revd A Campbell* says the Santals grow the plant *See Vol I* 485
B repanda.—Leaves *Lisboa* U P B p 203 *Shortt Ind For III* 235
Borassus flabelliformis.—Roots *Vol I* 502 also *Lisboa* U P B, p 207 *Shortt Ind For III* 235
Boswellia serrata.—Flowers and seeds eaten by the Bhíls *Vol I* 516 *Drury* says the Uriyas make a soup from the fruits in times of famine
Brassica.—Mustard Rape &c The leaves of these plants are eaten in times of famine *Fam Com Rept*

Famine Foods	(G Watt)	FAMIN Foods
<i>Bryonia laciniosa</i> .—Leaves boiled and eaten	Dec Fam	
<i>Buchanania latifolia</i> .—Fruit	Dec Fam	
<i>Buettneria herbacea</i> .—Leaves	Shortt Ind For III 236	
<i>Bupleurum falcatum</i> .—Root eaten by the Himálayan tribes		
<i>Butea frondosa</i> .—Roots	Dec Fam	
<i>Caladium ovatum</i> .—Herb	Dec Fam	
<i>Canna indica</i> .—Roots yield a useful arrowroot	Vol II 102	
<i>Canthium parviflorum</i> .—Leaves	Dec Fam Shortt Ind For, III 236 eaten also in normal seasons	
<i>Carallum adscendens</i> .—Shoots cooked	Shortt Ind For III 236	
<i>C fimbriata</i> .—Green foliicles	Dec Fam Vol II 141	
<i>Cardiospermum Halicacabum</i> .—Herb	Dec Fam Shortt Ind For III 236 Lisboa U P B p 197 Vol II 156	
<i>Carissa Carandas & C spinarum</i> .—Fruits	Shortt Ind For III 236	
<i>Carthamus tinctorius</i> .—Leaves and seeds	Dec Fam The rich ate the seeds during the famine at Sholapur	
<i>Caryota urens</i> , Willd The farinaceous part of the trunk was largely used in the famine of 1830	(Roab Ed C B C 668) Vol II 208	
<i>Cassia auriculata</i> .—Leaves	Dec Fam also Lisboa U P B p 198 Vol II 216	
<i>C Fistula</i> .—Flowers largely eaten by the Santals	(Rev A Campbell) Shortt Ind For III 236	
<i>C occidentalis</i> .—Leaves	Lisboa U P B p 198	
<i>C pumila</i> .—Herb	Dec Fam	
<i>C Sophora</i> .—Leaves	Lisboa U P B p 198 Shortt Ind For III 236 The disagreeable smell and flavour is removed by boiling	
<i>C siamea</i> .—Leaves	Dec Fam	
<i>C Tora</i> .—Leaves	Dec Fam Stewart Pb Pl 62 also Lisboa U P B 198 Largely used during famine but eaten also at all seasons especially during the month of Shráwan The seeds afford a good substitute for coffee	
<i>Celosia argentea</i> .—Herb	Dec Fam Stewart says that in the Panjáb it is used as a pot herb in times of scarcity	
<i>C cristata</i> .—Leaves and shoots	Shortt Ind For III 236 Vol II, 241	
<i>Cenchrus echinatus</i> .—Seeds	Vol II 246	
<i>Cephalandra Indica</i> .— <i>Cephalostachyum capitatum</i> , Munro	GRAMINEÆ Vol II 253	
<i>Ceropegia bulbosa</i> .—Root	Dec Fam Vol II 262	
<i>Chenopodium album</i> .—Herb	Dec Fam also regularly cultivated Vol II 265	
<i>Chlorophytum parviflorum</i> .—Leaves	Dec Fam Comp with Vol II 269 270	
<i>Chrysopogon montanus</i> .—The seeds of this grass are eaten in Rájputana	Vol II 274	
<i>Cicer arietinum</i> .—Gram	The leaves and stalks are eaten in times of famine Fam Com Rep	
<i>Clerodendron serratum</i> .—Herb	Dec Fam Vol II 375	
<i>Cleome viscosa</i> .—	Shortt Ind For III 236	
<i>Cocculus villosus</i> .—Leaves	Dec Fam Vol II 398	
<i>Coffee pulp</i> .—See	Vol II 489	
<i>Coix lachryma</i> .—Seeds	Dec Fam The Kew Bulletin for 1888 p 267 says the cultivated edible Coix is <i>C gigantea</i> the writer's specimens obtained in Manipur were cultivated Coix, but by the Kew authorities these were some time ago named as <i>C lachryma</i> . It seems probable that there is no specific difference, the one being the more readily	

FAMINE Foods	Famine Foods.
	recognisable cultivated state of the other (<i>Comp with Vol II, pp 491—500</i>)
	<i>Commelina bengalensis</i> .—Leaves <i>Stewart Pb Pl 236</i>
	<i>C communis</i> .—Seeds <i>Lisboa U P B p 206</i>
	<i>C obliqua</i> .—Leaves eaten in famine (<i>Atkinson</i>)
	<i>Corchorus trilocularis</i> .—Herb and seeds <i>Dec Fam</i> also given by <i>Lisboa U P, p 195</i>
	<i>C olitorius</i> .—Herb <i>Lisboa U P B p 195</i>
	<i>Cordia obliqua</i> .—Flowers and fruit <i>Dec Fam</i>
	<i>C Myxa</i> .—Fruit <i>Dec Fam Shortt Ind For III 236</i>
	<i>Corypha umbraculifera</i> Yields starch from the pith <i>Vol II 575</i>
	<i>Cressa cretica</i> .—Herb <i>Dec Fam Vol II 588</i>
	<i>Crinum defixum</i> .—The bulbous root <i>Lisboa U P B p 204 Vol II 590</i>
	<i>Crotalaria juncea</i> .—Leaves and pods <i>Dec Fam Vol II 613</i>
	<i>Curcuma caulina</i> .—Tubers <i>Dec Fam Vol II 658</i>
	<i>C pseudomontana</i> .—Tubers <i>Dec Fam Vol II 669</i>
	<i>Cyanotis axillaris</i> .—Seeds <i>Dec Fam</i> also <i>Lisboa U P B p 206</i>
	<i>Cycas circinalis, pectinata, & Rumphu</i> .—Yield starch from the interior of the stem
	<i>Cynanchum pauciflorum</i> .—The leaves eaten in Ceylon this does not appear to be known in India <i>Vol II 678</i>
	<i>Cynodon Dactylon</i> .—Leaves and culms <i>Lisboa U P B p 208 Shortt Ind For III 236</i>
	<i>Cyperus jemiucus</i> .—Tuber and leaf The former are ground into flour and eaten (<i>Vol II 685</i>) (<i>Roxb Fl Ind Ed C B C 65</i>)
	<i>Dalbergia paniculata</i> .—Leaves <i>Dec Fam</i>
	<i>Daucus Carota</i> .—Recommended as an emergent crop in times of threatened famine <i>Fam Com Rep Vol II 151 Conf also with Vol III of this work pp 48—52</i>
	<i>Dendrocalamus strictus</i> .—Male bamboo The seeds and shoots <i>Vol III, 77</i>
	<i>Digera arvensis</i> .—Herb <i>Dec Fam Vol III 112</i>
	<i>Dillenia indica</i> .—Calyx <i>Dec Fam Vol III 113</i>
	<i>Dioscorea anguina</i> .—This according to Roxburgh yields a tuber which is eaten in times of famine
	<i>D oppositifolia</i> .—Tubers <i>Dec Fam</i>
	<i>D pentaphylla</i> .—Leaves tubers and flowers <i>Dec Fam</i>
	<i>D triphylla</i> .—Tubers <i>Dec Fam</i>
	<i>Diospyros Embryopteris</i> .—Fruit <i>Dec Fam</i>
	<i>Dolichos biflorus</i> .—Is spoken of by Roxburgh as a crop that requires little rain and may therefore be grown when rice fails
	<i>Dracontium polyphyllum</i> (see <i>Vol II p 192</i>)—Is said by Drury (<i>U P 187</i>) to afford a tuber which is eaten in times of famine <i>Shortt Ind For III 236</i>
	<i>Dregea volubilis</i> .—Leaves <i>Shortt Ind For III 237</i>
	<i>Ehretia laevis</i> , <i>Roxb</i> Fruit and inner bark <i>Stewart Pb Pl, 153 Lisboa U P B p 202</i>
	<i>Elaeagnus latifolia</i> .—Fruit <i>Dec Fam</i>
	<i>Eleusine aegyptiaca</i> .—Seed-grains <i>Lisboa, U P B, p 268</i>
	<i>Embelia robusta</i> .—Leaves <i>Dec Fam</i>
	<i>Erinocarpus Nimmoanus</i> .—Fruit <i>Dec Fam</i>
	<i>Eriodendron anfractuosum</i> .—Seeds <i>Lisboa, U P B p 195; Shortt, Ind For III 236</i>
	<i>Erythroxylon monogynum</i> .—Leaves and young shoots <i>Lisboa U P B, p 195</i> Said to have afforded food to many thousand people during the famine in Madras of 1877 <i>Shortt, Ind For, III, 236—238</i>

Famine Foods.	(G Watt)	FAMINI Foods.
<p><i>Eugenia jambolana</i>.—Kernels. <i>Shortt, Ind For, III, 238</i> <i>Euphorbia pululifera</i>. (<i>Hirta Dals & Gbs</i>)—Leaves <i>Lisboa, U P B, p 203 Shortt Ind For III 236</i> <i>E. thymifolia</i>.—Herb <i>De Fam</i> <i>Feronia elephantum</i>.—Fruit. <i>Dec Fam</i> <i>Ficus bengalensis</i>.—Fruit <i>Lisboa U P B 204 Shortt Ind For III, 236</i> <i>F. glomerata</i>.—Fruit <i>Dec Fam Lisboa U P B, 204 Shortt, Ind For 236</i> <i>F. indica</i>.—<i>Fam Com Rep Vol II p 154 C P</i> <i>F. religiosa</i>.—Fruit <i>Dec Fam Lisboa, U P B 204 Shortt, Ind For, III 236</i> <i>Fimbristylis Kysoor, Roxb Dals & Gbs Bomb Fl, 288</i> The tuberous root <i>Lisboa U P B p 208</i> Fungi —Nearly all the species are eaten in famine <i>Garcinia xanthochymus</i> —Fruit <i>Shortt Ind For III 238</i> <i>Gisekia pharnaceoides</i> —Herb <i>Lisboa U P B p 200</i> <i>Glossocardia linearifolia</i>.—Leaves <i>Lisboa (U P B p 200)</i> thinks the identification is not correct and that the plant may be <i>Cyathoclyne lyrata</i> Grasses —Seeds of wild species are collected and eaten in times of famine <i>Grewia Microcos</i> —Fruit <i>Dec Fam</i> <i>Guatteria longifolia</i>. Fruit <i>Dec Fam</i> <i>Guazuma tomentosa</i>.—Capsules <i>Lisboa U P B p 195 Shortt Ind For III 236</i> <i>Gynandropsis pentaphylla</i>.—Leaves <i>Shortt Ind For III 236 237</i> <i>Hedychium coronarium</i> (also <i>H. scaposum Nimmo Dals & Gbs Bomb Fl 273</i>)—Tubers <i>Dec Fam</i> <i>Helmia</i>, see <i>Dioscorea</i>.—Tubers <i>Dec Fam</i> <i>Hibiscus tiliaceus</i> —Bark <i>Lisboa U P B p 194 Drury</i>, quoting Forster states that the stalks are sucked in times of scarcity <i>Holostemma Rheedu</i> —Flowers <i>Dec Fam Shortt Ind For III 237</i> <i>Hoya viridiflora</i>, = <i>Dregea volubilis</i> —Leaves <i>Dec Fam</i> also mentioned by <i>Lisboa U P B p 201</i> <i>Indigofera cordifolia</i> —Seeds <i>Dec Fam</i> also mentioned by <i>Lisboa, U P B p 197</i> A highly nitrogenous pulse <i>I. enneaphylla</i>.—Seeds <i>Dec Fam</i> <i>I. glandulosa</i>.—Seeds <i>Dec Fam</i> also mentioned by <i>Lisboa U P B p 197</i> Rich in nitrogen According to Roxburgh the seeds of this species are made into bread in times of scarcity (<i>Roxb Fl Ind, Ed C B C 583</i>) <i>I. limfolia</i>.—Seeds <i>Dec Fam</i> also mentioned by <i>Lisboa U P B p 197</i> Seeds largely consumed by the people of Kaládgi Dharwar, Sholapur Ahmednagar &c pounded and made into cakes either alone or with some cereals Rich in nitrogen <i>Ipomæa aquatica</i>.—Herb <i>Dec Fam Bengal Famine Shortt, Ind For, III 237</i> <i>I. eriocarpa, Br</i> —The plant <i>I. muricata</i>.—Peduncles <i>Dec Fam</i> <i>I. reniformis</i> —Herb <i>Lisboa U P B p 202 Shortt Ind For III 237</i> <i>I. separia</i>.—Herb <i>Lisboa U P B p 202 Shortt Ind For, III, 237</i> <i>Jasminum arborescens, var latifolia</i>.—Seeds <i>Dec Fam</i> <i>Launæa pinnatifida</i>.—Herb <i>Dec Fam</i> <i>Leea macrophylla</i>.—Leaves <i>Dec Fam</i> <i>Leptadenia reticulata</i>.—Leaves <i>Lisboa, U P B, 201 Shortt, Ind For, III 238</i> <i>Leucas aspera</i>.—Herb <i>Dec Fam Lisboa, U P B, 203 Shortt, Ind For, III 237</i></p>		

**FAMINE
Foods.****Famine Foods**

- Leucas cephalotes* — Herb *Dec Fam Behar Famina.*
Limnanthemum cristatum — Stems and fruit *Shortt Ind For, III, 238*
Lisboa U P B p 202
Linum usitatissimum — Green pods *Dec. Fam*
Maba buxifolia — Fruit *Shortt, Ind For III 237*
Macaranga Roxburghii — Fruit. *Dec Fam*
Malva parviflora, Linn — A pot herb eaten largely in famine
Mangifera indica — Kernels used in times of scarcity and famine. *Roxb*
Fl Ind Ed C B C 216 Shortt Ind For III 237
Melia Azaderachta — Fruit *Lisboa U P B p 196 Shortt Ind For*
III 237
Mengea (Amarantus) tenuifolia — Herb *Dec Fam*
Mimusops Elengi — Fruit *Shortt Ind For, III 237*
M hexandra — Fruit *Dec Fam* [*III 237*
Mirabilis jalapa — Leaves *Lisboa, U P B p 203 Shortt Ind For*
Mollugo stricta — Herb *Dec Fam*
Momordica Charantia — Leaves *Dec Fam*
Morinda citrifolia — Green fruit *Shortt Ind For III 237*
M umbellata — Fruit *Lisboa U P B p 200 Shortt Ind For III*
237
Mucuna pruriens — Seeds *Dec Fam*
Murraya Koenigii — Fruits *Shortt Ind For III 235*
Musa ornata — { Root *Dec Fam* Also mentioned by *Lisboa U P B*
M superba — { 204 The scape and the convolute leaf sheaths of
both these plants
Mussaenda frondosa — Flowers *Dec Fam*
Nelumbium speciosum — Root *Dec Fam*
Neptunia (Desmanthus) oleracea — Herb and pods *Lisboa U P B p*
199 Shortt Ind For III 236
Nymphaea lotus — Roots and seeds *Shortt Ind For III 237*
N stellata, Willd — Roots and seeds
Olea dioica — Fruit *Dec Fam*
Opuntia Dillenii — Fruit *Lisboa U P B p 199* [*III 233-237*
Orygia decumbens — Leaves *Lisboa U P B p 200 Shortt Ind For*
Oxalis corniculata — Seeds *Dec Fam* Leaves *Lisboa U P B*
p 196 Shortt Ind For III 237
Oxystelma esculentum — Follicle *Dec Fam*
Pachyrhizus angulatus — The tuberous root
Pandanus odoratissimus — Pulpy part of drupes (*Roxb Fl Ind Ed*
C B C 707) eaten in times of famine *Shortt Ind For III 237*
Panicum colonum — Seeds *Dec Fam*
P frumentaceum. Should be extensively cultivated in seasons of drought
as with little irrigation on any light soil it will afford a harvest within
six weeks of the date of sowing *Fam Com Report II 151*
Penicillaria spicata (Holcus spicatus, Dals & Gibs) *Lisboa U P*
B 208
Phaseolus adenanthus — The tuberous roots *Shortt Ind For III 237*
P Mungo — Is by Roxburgh spoken of as a crop that will grow in times
of threatened famine when rice fails
P trilobus — Seeds. *Dec Fam* [principle
P trinervius — *Lisboa U P B p 198* "Seeds rich in nitrogenous
Phoenix farinifera — The farinaceous substance in the trunk (*Roxb Fl*
Ind Ed, C.B.C., 723) (*Drury U P, 339*) Leaf-bud *Shortt Ind*
For, III 237
P sylvestris — Fruit *Dec Fam* Also leaf bud or cabbage *Lisboa,*
U P B, p 206 Shortt, Ind For, III, 237

Famine Foods	(G Watt)	FAMINE Foods.
<i>Pistia stratiotes</i> —Herb <i>Dec Fam</i>		
<i>Pithecolobium dulce</i> .—Fruit <i>Shortt Ind For, III, 237</i>		
<i>Pogostemon parviflorus</i> —Leaves <i>Dec Fam</i>		
<i>Polygala chinensis</i> .—Leaves <i>Lisboa U P B, p 194</i>		
<i>Porana racemosa</i> .—Peduncles <i>Dec Fam</i>		
<i>Portulaca oleracea</i> .—Shoots <i>Shortt Ind For III 237</i>		
<i>Pouzolzia tuberosa</i> .—The tuberous roots <i>Lisboa, U P B 204</i>		
<i>Premna latifolia</i> .—Leaves <i>Lisboa U P B p 202 Shortt Ind For, III 237</i>		
<i>P integrifolia</i> —Leaves <i>Lisboa U P B 203 Shortt Ind For III 237</i>		
<i>Prosopis spicigera</i> , <i>Linn</i> —Pods <i>Dec Fam Shortt Ind For, III 237</i>		
<i>Pteris aquilina</i> —The underground stems		
<i>Pterocarpus Marsupium</i> —Seeds and flowers <i>Dec Fam</i>		
<i>Randia uliginosa</i> .—Green fruit <i>Dec Fam</i>		
<i>Ranunculus sceleratus</i> —This is eaten by the inhabitants of Wallachia when cooked It is a powerful poison when not cooked		
<i>Rhynchoscarpa foetida</i> .—Fruit and leaves <i>Lisboa U P B, p 200 Shortt, Ind For III 235</i>		
<i>Rivea hypocrateriformis</i> —Leaves <i>Lisboa, U P B p 202 Shortt Ind For III 237</i>		
<i>Rothia trifoliata</i> —Leaves and pods <i>Lisboa U P B p 197 Shortt Ind For III 237</i>		
<i>Sagittaria & Alisma</i> .—Yield edible tubers the former being cultivated for this reason in North America There are several species in India, but no record exists of their being eaten		
<i>Salicornia brachiata</i> —Leaves and shoots <i>Shortt Ind For, III, 238</i>		
<i>Salsola foetida</i> —Herb <i>Dec Fam</i>		
<i>Santalum album</i> —Seeds <i>Lisboa U P B p 204</i>		
<i>Schleichera trijuga</i> —Fruit <i>Dec Fam Shortt Ind For III 238</i>		
<i>Schrebera swietenoides</i> —Leaves <i>Dec Fam</i>		
<i>Semecarpus Anacardium</i> —Green fruit <i>Dec Fam</i>		
<i>Sesamum indicum</i> .—Seeds made into oil cake		
<i>Sesbania aculeata</i> —Seeds <i>Dec Fam</i>		
<i>S ægyptiaca</i> .—Seeds highly nitrogenous <i>Lisboa, U P B p 197</i>		
<i>S procumbens</i> —Seeds <i>Dec Fam</i>		
<i>S grandiflora</i> — <i>Shortt Ind For III 235</i>		
<i>Sesuvium Portulacastrum</i> —Seeds and herb <i>Dec Fam</i>		
<i>Shorea robusta</i> —Seeds roasted and mixed with the flowers of the Mahua tree		
<i>Sida cordifolia</i> —Herb <i>Dec Fam</i>		
<i>Smilax ovalifolia</i> .—Leaves and root <i>Dec Fam</i>		
<i>Smithia sensitiva</i> .—Herb <i>Dec Fam</i>		
<i>Solanum Jacquini</i> —Unripe fruit curried <i>Lisboa U P B p 202</i>		
<i>S nigrum & xanthocarpum</i> —Herb <i>Dec Fam Shortt Ind For, III 238 Lisboa U P B 202</i>		
<i>S torvum</i> —Curried <i>Lisboa U P B 202 Shortt Ind For III 238</i>		
<i>Sorghum vulgare</i> (<i>Holcus saccharatus</i> , <i>Dals & Gibs</i>) — <i>Lisboa U P B, p 208</i>		
<i>Spathium chinense</i> (<i>Aponageton monostachyon</i>).—Tubers are boiled and eaten <i>Shortt Ind For III 235</i>		
<i>Spermocoe hispida</i> .—Seeds <i>Dec Fam Rev A Campbell mentions this as eaten by the Santals in times of great distress</i>		
<i>Spondias acuminata</i> .—Green fruit. <i>Dec Fam</i>		
<i>S mangifera</i> .—Leaves and fruit <i>Shortt Ind For, III, 238</i>		
<i>Sterculia foetida</i> .—Seeds <i>Dec Fam Shortt, Ind For, III 238</i>		
<i>S guttata</i> .—Seeds <i>Dec Fam</i>		

FARSETIA
Jacquemontii**Famine Foods**

- Strychnos potatorum**.—Fruit *Shortt, Ind For III* 238
Succeda maritima & nudiflora.—Leaves The leaves of this plant alone, the natives say saved many thousand lives during the famine of 1791 1792 and 1793 ' *Roxb, Fl Ind Ed C B C* 262 *Shortt, Ind For III* 238
Synantherias sylvatica.—Root petioles and leaves *Lisboa U P B* 208
Syzygium Gibsonii. (*Eugenia sp ?*)—Fruit *Dec Fam*
Tacca pennatifida.—Root *Dec Fam*
Tamarindus indica.—Leaves and seeds *Dec Fam Roxb Fl Ind, Ed C B C* 531 *Shortt Ind For III* 233—238
Tephrosia purpurea.—Seeds *Dec Fam*
Terminalia belerica.—Seeds *D c Fam* Gum eaten by the Santals
Theriophonium Dalzellii.—Leaves and petioles *Lisboa U P B* p 208
Toddalia aculeata.—Leaves *Shortt Ind For III* 238
Trapa bispinosa.—Seeds *Shortt, Ind For III* 238
Trianthema crystallina.—Seeds
T monogyna.—Leaves and shoots *Shortt Ind For III* 238
T pentandra.—Leaves and shoots *Lisboa U P B* p 200
Tribulus alatus, Delile.—Seeds
T teriistris.—Herb and seeds *Dec Fam* The small spiny fruits of this plant are said to have constituted the chief food of the people during the Madras Famine *Econ Prod of India Part VI* See also *Lisboa U P B* p 196
Trichosanthes cucumerina.—Fruit *Shortt Ind For III* 238
Triticum sativum.—(The chaff in famine) *Lisboa U P B* p 208
Typha elephantina.—Pollen *Dec Fam*
T latifolia.—Seeds *Dec Fam*
Typhonium bulbiferum.— } Bulb and leaves *Lisboa U P B* p 207
T divaricatum.— }
Urginea indica.—Leaves *Dec Fam*
Vangueria edulis.—Green fruit *Dec Fam*
Vitis quadrangularis.—Leaves *Dec Fam Shortt Ind For III* 236
Zea Mays.—Grain *Lisboa U P B* p 208 (The cobs in famine)
Zizyphus nummularia, W & A.—Fruit
Z jujuba.—Dry fruit powdered *D c Fam*
Z rugosa.—Fruit *Dec Fam*

Fan Palms, see *Borassus flabelliformis*, *Linn Vol I* 495

FARSETIA, Desv ; Gen Pl I, 72

A genus of under-shrubs or herbs comprising about 20 species natives of South Europe West Asia and North Africa There are three Indian species which have much the same habitat possess the same economic properties and are known to the natives by the same vernacular names they may therefore be considered collectively

33 **Farsetia aegyptica, Turr Fl Br Ind I** 140 **CRUCIFERÆ**

34 **F Hamiltonii, Royle, Fl Br Ind, I** 140

35 **F Jacquemontii, H f & T Fl Br Ind I,** 140

Vern.—*Mula, fārid bātī lāthia fārid mālī* Pb

References.—*Stewart Pb Pl* 13 *Murray Pl and Drugs, Sind* 49
Baden Powell Pb Pr 328 *Spons Encyclop.* 1070; *Gazetteer N W P*
IV *lawn* 1; *Punjab Montgomery Dist* 20 *Settlement Report of the*
Montgomery Dist 20

Habitat.—*F. aegyptica* is found in the Salt Range of the Panjāb
F Hamiltonii in the Upper Gangetic plain and the Panjāb, also from

F 35

Ornamental Feathers, &c.

(G Watt) FEATHERS.

Agra westwards and *F Jacquemontii*, in sandy places in the Panjáb and Sind

Medicine.—According to writers on the plants of the Panjáb, all three species have a pleasant pungent taste are pounded and taken as a cooling medicine and are considered specific for rheumatism

Food.—The Settlement Report of the Montgomery District says of *F Hamiltonii* "The seeds are said to be poisonous but were habitually used by Bába Farid Shakarganj when he was hungry"

The plant is described by Mr A. O Hume as a favourite food of the large bustard

MEDICINE.

36

FOOD
Seeds.

37

FEATHERS AND BIRDS USED FOR ORNAMENTAL PURPOSES

38

Dr Forbes Watson in his list of Indian Products drawn up in connection with a proposed Industrial Survey of India enumerates some 68 birds, the plumage of which are used for ornamental purposes It is, perhaps unnecessary to republish that list but it may be said to include many of the honey-suckers herons bitterns king fishers, storks, jays rollers egrets water hens bee-eaters orioles shrikes bulbuls snake-birds grebes, and the hoopoes These birds are systematically killed either for certain special feathers obtained from them or on account of their entire skins The following may be specially mentioned —

1st *Ceryle rudis* The pied king fisher

2nd—*Coracias indica*. The roller vulgarly known as the Blue Jay

3rd—*Herodias alba*. The large Egret

4th—*Houbara macqueeni* The Houbara Bustard

5th—*Leptoptilos argala*. The Adjutant or Gigantic Stork The feathers of this bird are known in trade as Marabout.

6th—*L javanica*. The Small Adjutant

7th—*Pavo cristatus* The Peafowl

8th—*Plotus melanogaster* The Snake-bird

9th—*Upupa nigripennis* The Hoopoe

In works treating of feathers the subject is generally referred to Common Feathers used in Upholstery Down Ornamental Feathers, and Quills

In India the feathers of domesticated birds are universally destroyed by the indolent, though expeditious system of removing them after immersion of the bird in hot water Were an effort made to remedy this defect India might afford a large supply annually of upholstery feathers. The same remark is practically applicable to the collection of down Of ornamental feathers there are generally said to be two classes—(a) those like ostrich in which the barbules are long and loose giving beauty of form and (b) those that manifest beauty and brilliancy of colour Within the past few years India may be said to have entered on a new industry—that of Ostrich Farming In another volume (under Ostrich) will be found some account of this industry but it is believed the Trade Returns of Feathers, at the present date refer mainly if not entirely to the second class of ornamental feathers Prior to the year 1879-80 the exports from India of ornamental feathers were valued at about 1½ lakhs of rupees Since that year however they seem to have steadily increased In 1880-81 they were valued at Rs 69,447; in 1882-83 at Rs 3,04,253 in 1884-85 at Rs 63,017 and last year (1887-88) at Rs 70,495. The imports are unimportant the highest record having been in 1886-87 when the imports of foreign feathers were valued at Rs 1,068.

Little or nothing can be learned regarding the total number of birds thus annually destroyed to meet this large export trade A missionary

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FELSPAR

Feathers Bile Felspar

once mentioned to the writer that were he to adopt the system pursued by traders in capturing and destroying the blue roller he could from the proceeds easily render his charge self supporting Dr Balfour gives in his *Cyclopædia of India* an interesting account of the industry in ornamental feathers A passage from that work may be here given 'Commercolly in Bengal, is celebrated for its egret's feathers for head-dresses tippets boas, and muffs and some of them are exceedingly beautiful and not inferior in quality to those imported into Great Britain from Africa The down of the young adjutant bird is also made into ladies boas and victorines The under tail coverts are collected and sold in considerable quantity Many are procured at Trichoor in Malabar In the Panjáb the narrow black wing feathers of the onkar are used to make the *kalgis* or plumes for the *khod* or helmet These plumes have a very elegant appearance they stand about 6 or 8 inches above the helmet The feathers of the bustard are similarly used In Madras dealers in birds feathers carry on their trade on an extensive scale One dealer had nearly 100 sets of hunters each composed of four or five shikaris and one cook most of these people are Korawa (basket makers) who live in and about Madras Each set has its headman who is responsible for the others These sets are sent out once a year each receiving from Rs 20 to Rs 100 together with a certain number of nets a knife &c They traverse all India collecting the feathers of king fishers and return after six or eight months to Madras each set bringing from 1 000 to 6 000 feathers which are taken by the dealers at Rs 14 per 100 and shipped to Burma Penang Singapore and Malacca bringing 10 to 13 dollars the 100 The blue feathers of the jay the king fisher and other blue feathered birds are largely used in China for ornamentation pasted on silver gilt

Feather Grass, see Stipa

FEL—BILE

Vern.—*Safra* HIND, *Pitta* SANS *Safra* ARAB; *Zahrahe* PERS.

Medicine.—The BILE of the buffalo wild boar goat peacock and the rohituka fish are used in medicine as laxatives and also in place of water in which to soak powders intended to be made into pills (*U C Dutti*)

GALL is an absorbent and purgative it is used along with antimony as a stimulant for the eye In 1 drachm doses mixed with 1 drachm of wax when taken internally it is said to cause abortion Bile made into an ointment is used in inflammatory swellings (*Dr Emerson*)

SPECIAL OPINIONS.—§ Bile of fish or of the goat is given in night blindness (*J N Dey Feypore*) Black pepper soaked in the bile of pigs for 40 days is given to cure madness (*V Ummegudien Mettappollan Madras*) Pigment calculi from the gall bladder of the cow *gorochana* are much valued by the natives as a medicine and fetch a very high price (*W Dymock Bombay*)

Felis, see Tiger

FELSPAR

Felspar—The felspar group of minerals is the most important of all the rock forming materials Granitic rocks may be said to consist of quartz mica and felspar The disintegration of granite frequently results in the quartz and mica being washed away with the decomposed materials of felspar left in a more or less state of purity This constitutes the finest of all known pottery clays. Impure clay may be said to be pure clay adulterated with organic and metallic substances.

F 51

48

MEDICINE

Bile

49

Gall

50

51

Ferns.	(G Watt)	FERNs.
<p>Several works refer to felspar as an economic mineral, such as the Manual of the Coimbatore District, pages 23 and 453; the Manual of Trichinopoly District page 67; and <i>Mason's Burma and its People</i>, pages 583 734, &c. Since, however felspar is employed almost entirely in the art of pottery, the reader is referred for further particulars to the article <i>Clay</i> in this work (<i>Vol II pp 360 to 368</i>)</p> <p>Fennel, see <i>Feniculum vulgare</i>, <i>Garin</i> ; UMBELLIFERÆ</p> <p>Fennel, Flower, see <i>Nigella sativa</i>, <i>Linn</i> RANUNCULACÆÆ.</p> <p>Fennel, Giant, see <i>Ferula</i> below</p> <p>Fenugreek, see <i>Trigonella Fœnum grœcum</i>, <i>Linn</i> LEGUMINOSÆ</p>		

FERNs

52

Ferns.—**Beddome** in his *Ferns of British India* describes over 700 species and varieties. This may be accepted as an enumeration of only the better-known Indian forms. Out of that large assemblage of highly ornamental plants however only some 10 or 12 are of interest economically. A very large number are grown as rockery and foliage plants but none are cultivated for food or medicine. One *Asplenium ensiforme*, *Wall* yields a bright red dye which stains the mounting paper. The most important food product afforded by this great family—the young underground stems and young fronds of the Common Braken Fern (*Pteris aquilina*)—are not in the writer's opinion eaten by the hill tribes of India. He has pointedly asked the Himālayan as also the hill tribes of Manipur and the Nilghiris but has invariably got the same reply *vis* that no part of that very plentiful plant is eaten. **Stewart** however would lead one to suppose that he had found the people eating it and **Oleghorn** states that when cooked it is juicy but rather insipid. The latter writer may be referring to his personal experience and not to the verdict of the people. At most hill stations however young fronds are regularly offered for sale and in Simla these appear for the most part to be those of *Asplenium* (*Anisogonium*) *esculentum* (*Vol I No 1587 A*). This is doubtless the plant which **Madden** speaks of as *Nephrodium eriocarpum* *Botrychium virginianum* **Swartz** also forms an article of food among the Himālayan tribes (*See Vol I 517*). In New Zealand and other islands of the South Sea where Tree Ferns abound the centre of the stem of an *Alsophila* and of a *Cyathea* consists of a mucilaginous pith which is used as food. In Sikkim one or two of the tree ferns are similarly eaten especially *Alsophila latebrosa*.

Several ferns are employed medicinally but in India the merits of the Male Fern (*Lastrea Filix mas*) do not appear to have been discovered although it is one of the most plentiful species on the hills from 4,000 to 10,000 feet above the sea. The various species of *Adiantum* are however extensively employed medicinally the one most generally to be seen in the drug shops being *A. venustum* (*see Vol I pp 110 to 114*). The Rev A Campbell mentions the fact that the Santals employ *Cheilanthes tenuifolia* (*see Vol II p 265*). An officinal root the *basfia* is by **Stewart** referred (probably incorrectly) to *Polypodium vulgare*. He wrote "I have no clue as to which of our Himālayan ferns this is generally derived from or whence it is brought but Kābul is given by one authority and Honigberger says the hills. It is used as an alterative. *Polypodium vulgare* does not occur in India though met with in Europe and Turkey in Asia. Dr Dymock refers the *basfia* to that species however but does not mention the region from which it is obtained. He says the rhizomes are aperient and deobstruent and are considered to act as an expellant of peccant humours they are also used as an alterative in a variety of

FERONIA
elephantum**The Wood Apple.**

disorders and are frequently combined with Cassia pulp and honey. He identifies the *baufai* with the Polupodion (*πρὶ πολυπόδιον*) of the Greeks, and the *Asrás-el kalb* of the Arabs. Among the other medicinal ferns may be mentioned *Actiniopteris dichotoma* (Vol I, No 448 A) which is used as an anthelmintic and styptic. Dymock mentions a species of *Asplenium* (known at Goa as *Kál pándan*) which is employed as an alterative in cases of prolonged malarious fever. *Asplenium fimbriatum* is said to be given by the natives of British Garhwal as a remedy for snake-bite.

FERONIA, Correa Gen Pl I, 305**Feronia elephantum, Correa; Fl Br Ind I 516** **RUTACEÆ**

THE ELEPHANT OR WOOD APPLE *Eng*, BALONG, *Port* POMMIER
D L ELEPHANT, *Fr*

Syn—*CRATÆVA VALLANGA* König

Vern.—*Kaith* *bilin* *kait* (*howit*) *kat* *bél* *havitha* **HIND**; *Kath bel*, *kait* *hdt* *bél* **BENG**; *Kasnta*, *koch-bel* **SANTAL**, *Koeta* **URIYA**; *Kyth* (**SHAJE HANPUR**) **N W P**; *Kait* *bilin*, **PB**; *Keiri* (**AJMIR MERWARA**) **RAJ**; *Katori* *kavatha* **SIND**; *Kabit* **IBERAR**; *Kavit*, *howit* **BOMB**; *Kawat* *kavith* *kavatha* *kovit*, **MAR**; *Kotha* *kavit* **GUZ**; *Vellam* **MADRAS**; *Vilam* *vallanga*, *velá* *kavit* *kairt* **TAM**; *Thana* *kavit* **KONKAN**; *Velagó* or *ndla* *velaga*, *elaka* *yellanga*, *hapidh*, **TEL**; *Bilmar* *byala* *du hannu* *byala*, *bilada* *bél* **KAN**; *Vilam* **MALAY**; *Hman* *mahan* **BURM**; *Divul* or *disul* (*meladi* *kurundu* **TAM** in **CEYLON**) **SING**; *Kapittha* *hapipriya* (dear to monkeys) *bilin* (*dadhíphala*—the fruit) **SANS**; *Kabit* **ARAB**; *Kabit* **PERS**

References—*Roxb Fl Ind Ed C BC 374*, *Brandis For Fl 56*, *Kurs For Fl Burm I 108*, *Gamble Man Timb 62*, *Dale & Gills Bomb Fl 30*, *Stewart Pb Pl 20*, *Sir W Elliot Fl Andh 82*, *133*, *145*, *159*, *190*, *Rev A Campbell's Report on Econ Prod Chutia Nagpur No 8211*, *Mason Burma and Its People 452*, *Stocks Report on Sind Sir W Jones V 119*, *No 42*, *Pharm Ind 48*, *Ainslie Mat Ind I 161*, *II 82*, *O Shaughnessy Beng Dispens 14*, *Moodeen Sheriff Supp Pharm Ind 140*, *Pereira Mat Med II, p 550*, *U C Dutt Mat Med Hind 131*, *303*, *Dymock Mat Med W Ind 2nd Ed 142*, *Pharmacographia Indica 281*, *Flück & Hanb Pharmacog 131*, *239*, *S A jun Bomb Drugs 22*, *Murray, Pl and Drugs Sind 19*, *Moodeen Sheriff's new work on Materia Medica South India (Proof Copy) pp 79—81*, *Baden Powell Pb Pr 334*, *Atkinson Him Dist 736*, *Econ Prod V 46*, *52*, *Drury, U Pl 212*, *Lisboa U Pl Bomb 34*, *148*, *250*, *291*, *Birdwood Bomb Pr 13*, *142*, *259*, *324*, *Cooke Gums and Gum resins 17*, *Atkinson, Gums and Gum resins 5*, *7*, *16*, *Lotard Dyes 33*, *Watson Report on Gums 4*, *18*, *20*, *34*, *65*, *68*, *Spons Encyclop 703*, *1414*, *1621*, *1668*, *1692-3*, *Balfour Cyclop 1086*, *Smith Dic 163*, *Treasury of Bot, 490*, *Kew Off Guide to the Mus of Ec Bot 25*, *Kew Off Guide to Bot Gardens and Arboretum 68*, *Journ As Soc II*, *1807*, *79*, *Home Dept Cor in connection with the Pharm of India 238*, *Indian Forester III 200*, *V, 13*, *XI 388*, *XIII 119*, *Gazetteers of Bengal (Orissa) II 180*, *Of N W P I 79*, *IV p LXIX*, *X 307*, *Of Mysore and Coorg I 40*, *Of Bombay V 24*, *285*, *360*, *VI 13*, *VII 39*, *40*, *42*, *XIII 25*, *XV 69*, *XVII 25*, *XVIII 47*, *Of Burma I 133*, *Of C P 136*, *Settlement Reports of C P Mandalá 89*, *Chanda VI Chindwara 110*, *Upper Godavery 38*, *Madras Manuals Cuddapah Dist 263*, *Trichinopoly Dist 78*, *Coimbatore Dist 41*, *Special Reports furnished for this work by the Conservator of Forests Southern Circle Bombay Northern Circle Bombay Berar; Coorg; N W P; Ajmir and Northern Circle Madras*

Habitat.—A medium sized tree found in the sub-Himalayan forests from the Rávi eastward; throughout the greater part of the plains of India being more plentiful in the moister tracts of Bombay Madras Bengal and Burma than in Northern India. To a considerable extent cultivated as a road side tree near villages. Stewart says he has not seen it wild.

The Wood-Apple.

(G Watt)

FERONIA
elephantum.

in the Panjáb and though also scarce in the North-Western Provinces the fruits obtained in Bundelkhand are spoken of as exceptionally fine. It flowers in February to May and the fruits ripen about October, and often remain a considerable time on the trees.

Gum—Dr Moodeen Sheriff (in his forthcoming work proofs of which have been obligingly furnished to the writer) gives perhaps the best account of this gum. He describes it as occurring in small roundish oblong or tapering tears or in broken pieces varying in size from a pea to that of a soap-nut generally colourless and transparent sometimes opaque with numerous minute cracks on the surface; odourless bland and mucilaginous in taste. This gum he continues, is very frequently confounded with the Indian Gum Arabic for it not only bears a great resemblance to it but there is also a great similarity between the pronunciation of the Tamil names of both the former being called *Vilam pishin* and the latter *Vélam pishin* (Gum *pishin*) *Feronia* gum being rather scarce and comparatively very dear the native druggists take advantage of the above facts and generally pick out the whiter and more transparent pieces from the Indian gum arabic and sell these for the former. The only ready and practical difference between these gums is that the gum of *F. elephantum* is invariably much whiter and more transparent than that of *Acacia arabica*. The *Pharmacopæia of India* confirmed by several writers on Economic Products describes the gum as occurring in the form of irregular semi transparent, reddish brown tears. Treated with water it affords a brownish tasteless mucilage not less adhesive than that of gum arabic for which it may be used as a substitute. Dr Dymock says. The gum is in tears or irregular masses yellow or brownish dissolved in water it forms an almost tasteless mucilage much more viscid than that of gum arabic made in the same proportions.

The chemistry of the gum does not appear to have been worked out. Flückiger and Hanbury (*Pharmacog.* 239—240) however give some interesting facts regarding it which have been reproduced by Dr Dymock in his *Materia Medica of Western India* and in the *Pharmacographia Indica*. Flückiger and Hanbury say that dissolved in two parts of water *Feronia* gum affords an almost tasteless mucilage of much greater viscosity than that of gum arabic made in the same proportions. The solution reddens litmus paper and is precipitated like gum arabic by alcohol oxalate of ammonium alkaline silicates perchloride of iron, but not by borax. Moreover the solution of *Feronia* gum is precipitated by neutral acetate of lead or caustic baryta but not by potash. If the solution is completely precipitated by neutral acetate of lead the residual liquid will be found to contain a small quantity of a different gum identical apparently with gum arabic, inasmuch as it is not thrown down by acetate of lead. A large proportion of *Feronia* gum they continue, is therefore by no means identical with gum arabic. It deviates polarized light $O 4^{\circ}$ to the right instead of 5° to left as with gum arabic. "Gum arabic may be combined with oxide of lead the compound (arabate of lead) contains 30.6 per cent of oxide of lead whereas the plumbic compound of *Feronia* gum dried at $110^{\circ} C$ yielded only 14.76 per cent of $Pb O$. ' *Feronia* gum repeatedly treated with fuming nitric acid produces abundant crystals of mucic acid.' And concluding their brief notice of this substance they add. We found our sample of the gum to yield 17 per cent. of water when dried at $110^{\circ} C$. It left 3.55 per cent of ash.

Dye.—At the beginning of the century Dr Ainslie wrote of the gum "that a celebrated painter mentioned to Roxburgh that it answers better for mixing with colours than gum arabic."

GUM.
54DYL.
Gum.
55

FERONIA
elephantum**The Wood Apple.****DYE**

Dr Warden in a note to the writer on this gum repeats the above statement and *Spons Encyclopædia* (page 1693) puts the matter even stronger. For preparing water colours, it has a reputation beyond all other gums. It is much cheaper than gum arabic while apparently equal to it for all purposes. This statement of the price of the gum would at least appear to be incorrect and the reputation of the gum as used with paints would seem to rest alone on Dr Ainslie's original statement.

Balfour gives two sentences which probably allude to one and the same substance. These are: 'When an incision is made in the trunk, a transparent oily fluid exudes which is used by painters for mixing their colours.' It yields a large quantity of a clear white gum much resembling gum arabic in its sensible properties. So again Oooke in his Report on Gums &c of India while referring to this reputed property writes that Dr Ainslie says that the wood apple gum is used by dyers and painters particularly the miniature and chintz painters. It is also employed in making ink and certain varnishes and by the brick layers in preparing a fine kind of whitewash. No modern writer has however confirmed the frequently repeated statement of its use to painters. Dr McOann for example in his *Dyes and Tans of Bengal*. Mr Liotard in his *Memorandum on Dyes and Dyeing* and Mr Wardle in his recent Report on the *Dyes of India* make no mention of *Feronia* gum. So also Sir E. O. Buck (in his work on the *Dyes of the North Western Provinces*) while dealing fully with the art of calico printing and distinguishing the properties of the gums used does not allude to *Feronia* gum.

OIL

56

Essential Oil

57

Oil—One or two writers mention an OIL but in such general terms that very little can be compiled of a definite nature on this subject. In the Settlement Report of the Chanda District for example it is stated that oil extracted from the fruit is a remedy against itch. Oooke in his *Oils and Oil seeds of India* says that the seeds are reputed to afford an oil. The authors of the *Pharmacographia Indica* write the leaves yield to distillation a small quantity of ESSENTIAL OIL similar to that obtained from *basil* leaves.

MEDICINE
Ripe Fruit.

58

Pulp

59

Rind

60

Unripe Fruit

61

Medicine.—The RIFE FRUIT made into a sort of *châtné* with oil spices and salt is esteemed by the natives. The fruit itself is an aromatic antiscorbutic and in the form of a sherbet is sometimes given to children alone or in combination with *bél* fruit as a stomachic stimulant. It is supposed to increase the appetite and to possess alexipharmic properties. The PULP is reputed to be especially useful in cases of affections of the gums and throat. It is also often applied externally as a remedy in snake-bite or employed to remove the pain caused by venomous insects. But for this purpose the powdered RIND may be employed if the pulp be not procurable. The Hindus regard the UNRIPE FRUIT as a useful astringent in diarrhoea and dysentery and Muhammadan authors for example the writer of the *Makhsan-el Adwiyá* affirm that the fruit is cold and dry in the second degree refreshing astringent cardiaca and tonic a useful remedy in salivation and sore throat strengthening the gums and acting as an astringent. Elephant apple is often used to adulterate *bél* fruit but the two fruits should be easily enough distinguished.

Leaves

62

The LEAVES are aromatic and carminative and have the odour of anise (*Ainslie*). The author of the *Makhsan el Adwiyá* describes them as very astringent and as possessing the taste and odour of Tarragon. Ainslie remarks that the native practitioners of South India (in his day) prescribed the leaves in the indigestions and slight bowel affections of children.

Bark

63

Gum

64

The BARK is said to be sometimes prescribed for biliousness.

The GUM has already been alluded to Ainslie was the first writer to affirm that in medicinal properties the gum of this tree came nearest of

The Wood Apple.

(G Watt)

FERONIA
elephantum

all Indian gums to the true gum arabic 'The Tamool practitioners prescribe a solution of gum arabic' he says, 'to relieve tenesmus in bowel affections and as we do in other cases requiring demulcents' and he states that for this purpose *Feronia* gum is commonly used for medicinal purposes by all the practitioners of Lower India

A fatty OIL has been incidentally referred to and although its exact source and nature have not been determined it may here be stated that according to some writers this oil is not only useful in itch and other skin diseases but in leprosy. A medicated oil is however also employed for these purposes which would be more correctly described as sweet oil impregnated with the pulp or powdered rind. It is probable that this preparation may be the so called *Feronia* oil of medical writers unless indeed the essential oil distilled from the leaves be the substance alluded to. Considerable ambiguity it must be admitted exists in the literature of *Feronia* oil.

SPECIAL OPINIONS—§ "Unripe fruit astringent Gum—Gum Arabic" (*Thomas Ward Apothecary Madanapalle Cuddapah*) Very common in the Mysore jungles. The unripe fruit is much used for dysentery and diarrhoea. (*Surgeon Major John North Bangalore*) The ripe fruit is by some said to promote digestion by others is regarded as deleterious bringing on rheumatism and chest complaints. (*Assistant Surgeon Shih Chunder Bhattacharya Chanda Central Provinces*)

Food—This tree produces a round hard shelled FRUIT of the size of a large apple which has a strong odour when ripe and a very acrid taste not unlike that of the Bengal quince. The natives sometimes eat the raw fruit with sugar. A jelly much resembling black-currant is prepared from the pulp of the fruit which however has a very astringent taste. *Surgeon-Major Robb* informs the writer that the fruit is used as a condiment. Under the paragraph **Medicine** above it has been stated that a *châtni* is also made of it. In the *Medical Topography of Dacca* it is said that the name Elephant apple proceeds from the fact that the elephant is very fond of the fruit. It is "Dr Taylor adds prepared by the natives as an article of diet by mixing the pulp with salt oil and pepper. *Dr Buchanan-Hamilton* in his account of Dinajpur says the fruit is eaten by the natives but is very poor. On the other hand many writers speak of the fruit in much higher terms. The Conservator of Forests Northern Division Madras in a recent communication says—

This tree is common and of good size in the Northern Circars. It is planted throughout the Circars and Carnatic. The fruits are eaten and may usually be seen on sale in the bazars. In the Trichinopoly Manual it is said the fruit is eaten by all classes. In the Settlement Report of Chanda it is affirmed that the fruit is much eaten and the leaves and the bark are used in cases of bilious illness.

Structure of the Wood.—Yellowish white hard. Annual rings distinctly marked by a white line. Weight about 50lb per cubic foot. It is used for house-building, naves of wheels, oil-crushers and agricultural implements. Somewhat contradictory opinions are given regarding this timber. *Dr Buchanan-Hamilton (Statistics of Dinajpur p 153)* says that "the wood is not applied to any use." The Conservator of Forests Southern Circle Bombay has recently reported that "the wood which is hard strong and lasting is used for various purposes." In the *Trichinopoly District Manual* it is stated that the wood is white, hard, durable, and fine-grained and in the *Mysore and Coorg Gasetteer* it is added to a similar description that the wood is "suited for ornamental carving."

Domestic Uses.—The hard dry shells of small FRUITS are used as snuff boxes.

MEDICINE.oil
65**FOOD**
Fruit.
66**TIMBER.**
67**DOMESTIC.**
Fruit.
68

FERULA.

The Source of Asafœtida.

Ferrum, see Iron.

69

FERULA, Linn Gen Pl, 1, 917

A genus of umbelliferous herbs comprising some sixty species a few of which, though growing on perennial root-stocks attain annually a height of from 8 to 10 feet. Interest in the species of FERULA is mainly centred on the sub-arborescent forms—the Giant Fennels—which may be said to be characteristic of the dry semi-desert tracts of Central Asia. From these are obtained the various forms of Asafœtida Galbanum Sambul &c. So much confusion even still exists however in the literature of these famed drugs that the writer has thought it the preferable course to give a concise review of the history of Asafœtida and rest satisfied with brief notices under the individual species of FERULA. But even in so far he will touch only on the species that can be regarded as connected with the Trade and Commerce of India.

HISTORY
70

History of Asafœtida.—When Dr Falconer in 1838 discovered *Narthex Asafœtida* in the valley of Astor North Kashmir it was at first supposed that the problem of the source of the drug asafœtida had been solved. The roots procured by him were planted in the Saharanpur Botanic Garden. Seeds were subsequently sent to the Royal Botanic Gardens at Edinburgh. In 1842 these germinated and in 1859 several of the plants flowered yielding seeds which were distributed to the various botanical gardens throughout the world. From this source the so-called asafœtida plant in cultivation was derived. It must be observed however that while this species yields an asafœtida like substance it has by no means been demonstrated that any portion of the asafœtida of European commerce is derived from it. Sir J D Hooker figured the plant in the *Botanical Magazine* No 5168. He then wrote that it yields excellent asafœtida in the form of copious milky juice. But he added. It would be impossible to discuss here the vexed question of the history of the origin of all the asafœtides nor would the discussion be very profitable. Long anterior to Dr Falconer's discovery the German traveller Kœmpfer in the year 1687 saw asafœtida being extracted from a species of *Ferula* in Lauristan in Persia. He brought to Europe samples of the resin and a fragmentary specimen of the plant from which that resin had been obtained. These specimens were described by Linnæus under the name of *Ferula Asafœtida*. But Kœmpfer's collections are in the Sloane Herbarium at the British Museum and were carefully examined by Dr Falconer with the result that he entertained a strong suspicion that *Ferula Asafœtida*, Linn was not the plant he had discovered in Northern Kashmir. He accordingly named his plant *Narthex Asafœtida*. Hooker (*Bot Mag 1 c*) wrote that it is certain that Kœmpfer had two plants (species or varieties) in view from different countries that his descriptions and drawings and specimens (in the British Museum) do not tally and that though Dr Falconer considers his plant one of Kœmpfer's other botanists do not. The discovery in the Steppes east of the Caspian of the plant Bunge named *Scorodosma foetidum* is also referred to by Hooker. Borszczow who devoted some attention to the genus *Ferula*, also examined Kœmpfer's specimens and came to the conclusion that they should rather be referred to *Scorodosma*. Royle on the other hand held the opinion that Kœmpfer's plant should be assigned to the genus *Narthex*. More recently Boissier referred an asafœtida yielding species discovered by him in Persia to *Ferula Asafœtida*, Linn and that modern writers regard as *Scorodosma foetidum* Bunge a synonym for *Ferula foetida*, Regel but view it as most probably not *Ferula Asafœtida*, Linn. Dr Dymock however writes to the author that he is disposed to think that *Ferula Asafœtida*, Linn may prove the same as *Ferula foetida*, Regel.

The learned authors of the *Pharmacographia* are careful to say that it has not been proved that either of the plants reputed to yield the

Two forms of Asafoetida.

(G Watt)

FERULA.

HISTORY

Asafoetida of European commerce is actually the source of that drug. The species they allude to are *Ferula Narthex*, Boiss (the *Narthex Asafoetida*, *Falconer*) and *Ferula Scorodosma*, Benth & Trim (the *Scorodosma foetidum*, Bunge and *Ferula Asafoetida*, Linn in Boiss Fl Or). Dr Dymock has the honour of having been one of the first writers who pointedly drew attention to the fact that the Asafoetida most highly prized in India is distinct from the Asafoetida of European commerce. This was noticed some time previously however by Guilbourt *Hist des Drogues*, III 220 (1850) and named by Vigier *Asafoetida nausaeux—Gommes résines des Ombellifères Paris 1869*. Dr Dymock restricted the vernacular names (which prior to his study of the subject were viewed as synonymous) assigning to the Indian most highly prized drug the name of *Hing* and that of *Hingra* to the European Asafoetida. In a letter to the writer he says however that the name *Hing* may be applied to any choice asafoetida. *Hingra* means common asafoetida just as *Rai* in Guzerathi means Mustard and *Raira* Rape. With the public generally all kinds of asafoetida are *Hing*. Flückiger & Hanbury in their *Pharmacographia* speak of *Hingra* as if it were an inferior quality of the European asafoetida instead of the Indian name for that drug. There are, however many qualities of both *Hing* and *Hingra* and adulteration with foreign materials is carried to a great extent. But it would seem also that there are apart from adulteration different qualities the result perhaps of more careful preparation or due to being derived from different parts of the plant or to being collected at different seasons, or from different species of *Ferula*. Dr Dymock was fortunate in procuring from a merchant at Yezd specimens of the plant which affords the Khorasan asafoetida—the drug which on arrival in India is designated *Hing*. These specimens he forwarded to the late Mr D Hanbury and that gentleman submitted them to M Boissier who identified them as *Ferula alluacea*, an opinion which Hanbury entirely concurred in. Thus so far a definite conclusion seemed to have been arrived at. The Indian Asafoetida or *Hing* was established as obtained from a distinct species from the article *Hingra* or European asafoetida. The *Ferula sp Hingra* of the first edition of his work Dr Dymock in his second edition identified as obtained from *Ferula Narthex* Boiss and *Scorodosma foetidum*, Bunge. In his account of this product he there says — Commercial Asafoetida is collected by the Kákar Pathans in Western Afghanistan; in May the mature roots begin to send up a flowering stem which is cut off and the juice collected in the manner described by Kämpfer who witnessed its collection in the province of Láristan in Persia. Dr Dymock obtained this information together with a specimen of the plant from Dr Peters, but in a correspondence on this subject he authorises the writer to say that he is now convinced Dr Peters' plant is *Ferula foetida*, Regel.

Turning to the more recent botanical publications regarding Afghanistan—Dr Aitchison's various official reports—it is somewhat surprising that that author makes no mention of having seen *Ferula Narthex*. He deals however with *Ferula foetida*, Regel and under that species he places the following synonyms — *F Scorodosma*, Benth & Trim *Scorodosma foetidum* Bunge and *Ferula Asafoetida*, Boiss. He affirms that the resin obtained from that species is "the drug of commerce called Asafoetida—*Angusa Hing*". Before the Pharmaceutical Society of Great Britain, Dr Aitchison also read a paper dealing with the economic products of Afghanistan and was highly complimented for the valuable services he had rendered in clearing up many obscure points regarding Asafoetida, Galbanum &c &c. The opinion seemed to have been formed that the whole difficulty regarding Asafoetida had been removed.

FERULA

Two forms of Asafoetida

HISTORY

In the correspondence with Dr Dymock (to which reference has been made above) there occurs the following passages which may fitly be quoted in concluding this brief review. I think he writes we may regard it as settled that the asafoetida of commerce in Europe is all derived from *F foetida*, *Regel* growing in Persia and Afghanistan. Dymock retains two species however as yielding—the one the Indian the other the European—asafoetida and (following Holmes) gives the synonymy of these species as follows :—

"1 *Ferula alliacea*, Boiss

Syn — *F ASSAFŒTIDA*, Boiss et Bunge non Linn

' This produces the *Hing* of Bombay markets—the kind of asafoetida preferred as a condiment in India.

"2 *F foetida*, Regel

Syn — *F SCORODOSMA*, Benth & Trim (wrongly lettered in their plate No 127 as *FERULA FOETIDA* Benth & Hook f) also *SCORODOSMA FOETIDUM* Bunge and *F ASSAFŒTIDA* Boiss (f Linn)

" The selected gum from the bud is called *Kandahari Hing* and fetches a high price. The thick opaque gum afterwards obtained from the root is the asafoetida of European commerce

Presumably, therefore the opaque gum is the *Hingra* but according to the above notes the same species furnishes a superior form of *Hing* also. It may accordingly be suggested that perhaps after all certain species of *Ferula* yield either *Hing* or *Hingra* or both these drugs—the superior and inferior qualities of Asafoetida. Future research may reveal the fact that as with *Cannabis sativa* in affording various resinous substances so with certain species of *Ferula*, different systems of extraction and manipulation or diversified conditions of climate and soil produce both *Hing* and *Hingra*. It is difficult to believe that only two species contribute to the supply of these products while perhaps half a dozen are alluded to by travellers as affording a milky sap which on drying possesses at least the physical properties of Asafoetida. It may however be safe to affirm that the bulk of the Persian drug imported into India by sea is the *Hing* derived from *Ferula alliacea* but that a considerable proportion of the *Hingra* comes also from Persia and Turkistan. The whole of the asafoetida that enters India by the frontier land routes from Afghanistan is now satisfactorily proved to be derived from *F foetida*. This conclusion would seem to be borne out by the trade returns of India where a far larger quantity of *Hingra* (European Asafoetida) is shown to be exported to Europe and other countries than would appear to be imported from Afghanistan by road rail and river

TRADE
71

TRADE IN ASAFŒTIDA

In the statement of the Trade and Navigation of British India Asafoetida was apparently first separately returned (apart from other minor drugs) in the year 1876-77. Since however almost the entire traffic takes place with Bombay the Asafoetida statistics of that Presidency for earlier years may be accepted as representing the whole of India. In the report for 1868-69 two forms of asafoetida are separately recorded in the Presidency Statistics these were :—

(a) *Hing*—

Imports from the Persian Gulf	1 538 cwt	valued at R 85 118
Madras	7	412
Sind (Karachi)	695	18 455
These give a total of <i>Hing</i> imported into		
Bombay of	2,240	1 03 985

Trade in Asafoetida.		(G Watt)	FERULA.
(b) <i>Hingra</i> —			TRADE.
Imports from the Persian Gulf	1 893 cwt., valued at R	18,935	
, Sonmeance and Meckran	20 " "	114	
These give a total of <i>Hingra</i> imported of	1 913 " "	19 049	
<p>The <i>Pharmacographia</i> quotes the similar returns for 1872-73 viz., 3,367 cwt. of <i>Hing</i> and 4 780 cwt of <i>Hingra</i> but the authors of that work would appear to have regarded the former as the asafoetida of European commerce and the latter a crude article since they write the value of the latter is scarcely a fifth that of the genuine kind. Later on they deal with <i>Hing</i> remarking that among the natives of Bombay a peculiar form of asafoetida is in use that commands a much higher price than those just described. This mistake is here pointedly alluded to as it is current in the literature of asafoetida. As stated above there are doubtless many qualities of both <i>Hing</i> and <i>Hingra</i> but the asafoetida of European commerce is <i>Hingra</i> not <i>Hing</i>. In 1876-77 the total imports by sea into India (of <i>Hing</i> and <i>Hingra</i> collectively) were 4,472 cwt. valued at R 2 16 638 and from that year to the present date all but a few cwt. of the imports by sea have come from Persia. Madras and Bengal occasionally receive small parcels from Ceylon or Aden but with these exceptions the entire traffic takes place between the Persian Gulf and Bombay. Asafoetida is not separately returned in the statement of coastwise traffic (e.g. between province and province) but it would appear that a much larger share in this trade is yearly being taken by the railways. For example an important item of the coastwise traffic in asafoetida used formerly to consist in the supplies drawn by Bombay from Karáchi. A very considerable slice of the Indus river trade has doubtless been taken by the Kandahar State Railway (tapping the Kandahar source) and by the North Western Railway at Peshawar, draining the Kábul market. The following may be given as the IMPORTS of Asafoetida into India by land during the past five years —</p>			
1884-85	1 218 cwt.	valued at R	1 04,023
1885-86	1 775		95,652
1886-87	1 090		53 310
1887-88	1 030		47 192
1888-89	907 "		37 615
Of these land imports the major portion comes from Kábul and is presumably therefore derived from <i>F. foetida</i> ,—the <i>Hingra</i> .			
The IMPORTS by sea during the corresponding periods were :—			
1884-85	10 340 cwt.	valued at R	3 50 076
1885-86	7 228		2 69 883
1886-87	5 704		2 53 303
1887-88	4 521		1 70 973
1888-89	9 504		4 31 502
The figures for the last of these years relate to Bombay as a rule. Sind is the only other province that receives asafoetida by sea (except small quantities imported by Bengal and Madras from Ceylon or Aden) and the imports into Sind were last year 50 cwt. valued at R 797. During the same periods the foreign EXPORTS (drawn from the above imports) were —			
1884-85	2 638 cwt.	valued at R	57,471
1885-86	2 530		49,026
1886-87	1 865 "		42 543
1887-88	1,553 "		37,451
The figures for the year 1888-89 have not as yet been published. It will thus be seen that, deducting these exports from the total imports (in			
			IMPORTS By land. 72
			By sea. 73
			EXPORTS. 74

FERULA.

Trade in Asafoetida.

TRADE.

round figures) about two-thirds of the imported drug remain in India, so that India is itself perhaps the largest asafoetida-consuming country in the world. The highest exports on record were in 1883-84, *vis* 4,065 cwt valued at Rs 6457 and the following year showed the highest imports, *vis*, 10,340 cwt, valued at Rs 50,076.

In the statement of the Trade and Navigation of British India however a trade is shown in exporting asafoetida which is returned as Indian produce and manufacture. The writer is utterly at a loss to understand what this can mean. He is not aware that any asafoetida is produced in India and therefore (as with camphor) it seems probable that the drug undergoes some process of manufacture more probably a systematic adulteration than a purification. There are two features of this so-called Indian asafoetida that may be here mentioned. It goes entirely to the United States of America, Australia and Mauritius, none of it to Europe or China. It is exported from Calcutta or Madras, none of it from Bombay—the port that supplies Europe and China. The trade in the so-called Indian asafoetida fluctuates very considerably but it seems to have been steadily declining for some years back. In 1879-80 however it amounted to 1,130 cwt valued at Rs 23,698 and of this the United States took 943 cwt. In 1884-85 it amounted to 1,343 cwt but the average of the past ten years does not much exceed 300 cwt and in 1887-88 the trade had decreased to 4 cwt 3 of which went to Australia.

PRICES &c

75

PRICES DESCRIPTION &c—The declared value of products in trade statistics are not often of much practical importance since dealers may be presumed to give a valuation of their articles which best suits their own interests. Viewing the figures given above remarkable fluctuations in the declared values will be observed which are to some extent doubtless due to the reason given above. The article varies much however according to supply and purity. Dr Dymock says of *Hingra* the imports into Bombay are about 2,500 cwts annually from Persia and Afghanistan. Value Rs 10 to Rs 20 per Surat maund of 37½ lbs. There would seem to be some mistake as to this estimate of the extent of the Bombay imports of *Hingra*. Last year (1888-89) the imports by sea were 5,042 cwt and from Kábul 907 cwt. An average of 5,000 cwt of *Hingra* would thus appear a safer estimate. Dr Dymock next deals with Khandaharí *Hing* which he concludes is derived from the same plant as *Hingra*. He says it comes into the Bombay market in small quantities it is sewn up in goat skins forming small oblong bales with the hair outside. When it first arrives it is in moist flaky pieces and tears from which a quantity of reddish yellow oil separates on pressure the gum resin is also of a dull reddish yellow colour soft and somewhat elastic with an odour recalling that of garlic and oil of caraways. By keeping it gradually hardens and becomes brittle and of a rich red brown colour the odour also becomes more purely alliaceous and approaches to that of the commercial kind. This kind of *Hing* is entirely consumed in Bombay by the manufacturers of adulterated asafoetida its strong odour and flavour making it especially valuable for this purpose. The average value is Rs 25 per Surat maund of 37½ lbs. The ordinary form of *Hingra* (good quality) 'occurs in tears or flat pieces upon the under surface of which particles of sand often adhere the external surface is yellowish but the fresh fracture is of a pearly white which by exposure to the air becomes bright pink and finally dirty yellow. Inferior samples consist of agglutinated tears, with a certain proportion of moist brown clammy gum resin filling up the interspaces between them. Sometimes the asafoetida which comes from Persia is a homogeneous, soft white, mass like clotted cream, these parcels upon exposure to the air develop

Asafoetida—Hing

(G Watt)

**FERULA
alliacea.****TRADE.**

an unusually bright pink colour The drug has a powerful but not purely allhaceous odour and a bitter acrid taste (*Dymock*)

Of *Hing* Dr *Dymock* also furnishes an admirable description It is known in the Bombay market, he says, as *Abu-shaheri Hing* it arrives in skins which contain about 100lb, latterly some boxes have been received The quality varies greatly; inferior parcels contain an undue proportion of the root in Bombay it is often still further adulterated by mixing it with gum arabic in different proportions according to the priced article required To do this the package is broken up and moistened the gum is then added and the whole trodden together by men with naked feet upon a mat. When sufficiently mixed it is sewn up in skins to imitate the original packages Recently adulteration with sliced potato has been observed *Hing* of good quality is worth about Rs80 per cwt in Bombay In an earlier passage Dr *Dymock* gives additional facts regarding this form of asafoetida. He writes "The collected mass consisting of alternate layers of root and gum resin when packed in a skin (in quantities of about 100lb) forms the *Hing* of Indian commerce it is imported into Bombay in large quantities (about 2 500 cwts annually) and is valued at the Custom House for assessment at Rs55 per cwt. commercial asafoetida *Hingra* being only valued at Rs20 It may here be added that the imports of *Hing* for many years past have never been below 3 500 cwt and last year they were 4 462 cwt In a report on the Land Trade of Sind it is stated that Afghanistan asafoetida is valued at Rs50 per maund "while that imported from Beluchistan is only Rs14 per maund the latter having been of a very inferior or coarse description Dr *Alitchison* came across a root of asafoetida in Northern Beluchistan after much difficult searching which he believed to belong to another species *s.s.*, not *F foetida*. He found many leaves in traversing the plains, where he believes during summer the plant must have grown in abundance There are only one or two other isolated references to a Beluchistan asafoetida but nothing of a definite nature can be learned regarding it The imports by the Kandahar State Railway are valued very much higher than those that appear in the other commercial returns But in concluding this statement of the Indian trade in asafoetida the reader's attention may be directed to the fact shown in the statement of the imports from Karachi to Bombay (quoted in the opening paragraph above) viz that *Hing* and not *Hingra* as might have been expected appears in the early official returns

(F Murray)

Ferula alliacea, Boiss

Syn.—F ASSAFOETIDA Boiss et Bunge (non Linn) Fl Or II 995

Vern.—*Hing* HIND *Anjudan* KASHMIR; *Hing* BOMB; *Hing*, GUZ; *Kyam perungayam* TAM; *Hingu* SANS; *Hiltut* ARAB; *Angusa angusach* PERS

As explained above the name *Hing* literally means pure or superior *Hingra* It is thus probable that all the vernacular names for this and the next species are vulgarly applied to the resinous substance obtained from any of these *Ferulas*.

References.—*Pharm Ind* 102 *Analist Mat Ind* I, 30 *O'Shaughnessy Beng Dispens* 363 *Moodeen Sheriff Supp Pharm Ind* 81; *Dymock Mat Med W Ind 2nd Ed*, 381; *Flück & Hand, Pharmacog*, 319 *S Arjun Bomb Drugs* 66; *Waring Basar Med*, 21 *Birdwood, Bomb Pr* 40 *Cooke Gums and Gum-resins* 52 55; *Spon's Encyclop* 1634; *Kew Off Guide to the Mus of Ec Bot* 76

Habitat.—A herb of much the same appearance as *F foetida*, but smaller growing only to a height of from 2 to 4 feet, the diameter of the crown of the root seldom attaining more than 2 inches. Found in Eastern

FERULA
alliacea.**Asafoetida—Hing**

Persia in the neighbourhood of Djendack and Yezd, and in Khorassan near Seharud Nischapur Meshed Dehrachtindjan and Kerman (Buhse) Called *Angushkeh* in Khorassan and *Zendebug* in Kirman (*Boiss Fl Or*, 995) It grows on stony arid soil and to an altitude of 7 000 feet

Cultivation.—Grows wild, is not cultivated

CULTIVATION

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GUM RESIN
Collection.
78

GUM RESIN

COLLECTION—The following description is given by Dr Dymock (*vide Mat Med of Western India p 382*) on the authority of a merchant of Yezd who had personally seen the process going on —

The hill men collect the gum-resin taking an advance from the merchants The time for collecting it is in the spring The collectors protect each plant by building a small cairn of stones round it; they also remove the soil from the upper portion of the root making a kind of circular basin When the stem begins to grow it is cut down and the upper part of the root being wounded a small quantity of very choice gum is collected which seldom finds its way into the market Afterwards a slice of the root about $\frac{1}{2}$ inch thick is removed every two or three days with the exudation adhering to it until the root is exhausted The collected mass consisting of alternate layers of root and gum resin when packed in a skin (in quantities of about 100lb) forms the *Hing* of Indian commerce

Characters
79

CHARACTERS.—The gum resin as found in the market consists of a blackish brown originally translucent brittle mass of extremely foetid alliaceous odour unadulterated by earth or gypsum but always containing slices of the root Dr Dymock mentions that in Bombay it is often adulterated by the addition of gum arabic and that the cheaper sorts contain an undue proportion of the root This is produced by the exhausted root being cut up and mixed with the gum resin and water Recently adulteration with sliced potato has been observed

The term *hira hing* is said to be applied to a liquid of treacly consistence often found in the centre of the bales which is squeezed out and sold at a high price (*Spons Encyclop*)

Chemistry
80

CHEMICAL COMPOSITION—The essential oil is very abundant, and differs from that of *Hingra* in having a reddish hue being of higher specific gravity and having a much stronger rotatory power

An alcoholic tincture is not precipitated by acetate of lead nor is the sulphuric acid solution fluorescent In all these respects there is consequently a well marked difference between *Hing* and *Hingra* (*Fluckiger and Hanbury*)

MEDICINE
Gum-resin
81

Medicine—This drug is very much used in India and has, from the earliest times been held in great esteem by eastern doctors It is reputed a carminative and antispasmodic, and therefore as useful in colic cholera, &c and when taken daily it is said to ward off attacks of malarial fever Hindú medical writers direct it to be fried before being used The Muhammadans place asafoetida amongst their aphrodisiacs and hypnotics and consider the **FRUIT** to be stimulant (*Dymock*) *Waring in the Pharmacopæia of India* writes it produces excellent effects in the advanced stages of pneumonia and bronchitis in children Information collected from medical men in various parts of the country shew that the drug is considered useful as a carminative in colic and flatulent dyspepsia, as an anthelmintic in cases of round worm and as an emetic It is also described by two writers as a useful local anæsthetic in hemicrania and dental caries.

SPECIAL OPINIONS—§ *Hing* is said to be used internally in guinea-worm and colic. Dose 5 to 15 grains, made into a paste with water it is used as an external application to frontal headache" (*Joseph Parker, M.D.*,

Fruit.
82

Asafoetida—Hingra.

(J Murray)

FERULA foetida.

MEDICINE.

Deputy Sanitary Commissioner Poona) 'It is also an aphrodisiac; and is very useful in rendering *dál* digestible—an important article of native dietary (*Surgeon Major A S G Jayakar Mushat*) 'Useful in dyspepsia with indigestion' (*Surgeon J C H Peacocks I.M.D., Nasik*) Given as an emetic in poisoning by opium and other substances Also used to expel round worms Very useful in flatulent colic" (*Assistant Surgeon Shib Chundra Bhattachary, Chanda Central Provinces*) 'An emulsion (grs 5 to 1 drachm) dropped into the nostril is useful in cases of hemicrania In caries of the teeth a mixture of opium and hing may be put into the hollow tooth (*Surgeon James McCloghey Poona*) "The utility of asafoetida in the early stages of cholera appears to me to be undoubted It should be given in combination with camphor and black pepper opium being added if the disease is not fully developed" (*Surgeon S H Browne M.D. Hushangabad Central Provinces*) 'The native midwife uses this to encourage the lochial discharge after child birth The gum resin is first fried a small quantity is then mixed with garlic and palmyra jaggery a bolus is thus made and given to the patient every morning' (*Surgeon W F Thomas Madras Army Mangalore*) 'I have found it very useful in reducing the irritant properties of purgatives when they have to be continued long as in spleen diseases' (*Surgeon K D Ghose M.D. M.R.C.S. Kholna*)

Food—The GUM RESIN is employed by the natives of all parts of India as a condiment and is especially prized by the vegetarian Hindu classes It is mixed in various ways with rice *dál* &c There is no mention of the stem or leaves of this species being used as food or fodder

Trade—See article Trade under the account of the genus.

FOOD
Gum-Resin.
83

Ferula foetida, Regel

Syn—FERULA SCORODOSMA *Bent & Trim Med Pl No 127*; SCORODOSMA FOETIDUM *Bunge* FERULA ASAFOTIDA *Boiss Fl Or II 99 (non Linn)*

Vern—Hingra (also Hing) **HIND**; *Angusa kema kurna-kema shora kema* (the plant) *Hing* (the Resin) (according to Aitchison in *Afghan Delim Com Report*) **AFG** *Vaghayani SIND*; *Hingra BOMB*; **HINGU SANS**

References—*Aitchison's Afghan Del Com Rept p 68 Irvine Med Top Ajmir (F Narthex) 136; Fleming Med Pl & Drugs (F Narthex) in As Kes, Vol XI, 185 Pharm Ind 102 O'Shaughnessy Beng Dispens 37 Dymock Mat Med W Ind 385 Fluck & Hanb Pharmazieg 314 S Arjun Bomb Drugs 67, Jour and Trans Pharmac Soc 3rd Ser XVII 465 Birdwood Bomb Pr 41, Cooke Gums and Gum resins 50 Dr F Watson's Report on Gams (ed by P W D) p 26 Review in the Chemist and Druggist of Dr Aitchison's paper on Plants and Plant-products of Afghanistan delivered before the Pharm Soc of Great Britain; also the same reprinted in the Indian Forester XIII 90-95*

NOTE—Many of the references above are to passages describing *Ferula Narthex* or *Narthex Asafoetida*, which are presumed to be in reality accounts of *F foetida*, Regel

Habitat.—A herb with a circular mass of foliage which may grow to the extent of 6 feet in diameter springing annually from the perennial root stock the flowering plant shoots up a stem peculiarly massive and pillar like, to the height of 4 to 5 feet. It has been described by Lehman as growing over the whole of Southern Turkistan as far north as the river Syrdarja, by Bunge it was found in the sandy deserts and arid hills of Eastern Persia in Khorassan and the neighbouring parts of Afghanistan near Herat and by Dr Aitchison (with the Afghan Boundary Commission of 1884-85) in the same region. It has also been collected further north in Central Asia between the Caspian and Sea of Aral by Boreczkow

84

FERULA
foetida**Asafoetida—Hingra.****CULTIVATION**

85

Cultivation.—It is described by Aitchison and others as growing freely of itself without any cultivation in the sandy deserts of the countries given above. Dr Aitchison in his paper on 'Some Plants of Afghanistan and their Medicinal Products' writes,—The country in which these *UMBELLIFERÆ* flourish consists of the great shingle and conglomerate plains lying between the hills and the beds of the rivers which are broken up by numerous ravines and traversed by what are usually dry water-courses which once in every two or three years on the occurrence of heavy falls of snow on the hills above or local showers of rain suddenly become roaring torrents. The altitude of these plains above the sea level ranges from 2 000 to 4,000 feet. These plains during winter are perfectly treeless and bare the only signs of a past vegetation being the gnarled remains scarcely over a foot in height of a few shrubs. In early spring great cabbage-like heads are to be seen distributed at intervals amongst the asafoetida plants. Their peculiar forms represent the primary stages of the flower heads enclosed and completely covered up by the large sheathing stipules of its leaves. From these the tall flowering stalk arises and the circular mass of foliage springs out after which the plant assumes its fully grown appearance. Only about one plant in a hundred is said by Aitchison to bear a flowering stem. The only localities in India offering the natural conditions required for the growth of *F. foetida* are perhaps parts of the sandy deserts of Rajputana, Sind and the Panjáb. The remark therefore in *Spons Cyclopædia* drawing the attention of planters in India to the simplicity of its cultivation seems rather out of place.

GUM RESIN

86

Collection

87

Gum-resin.—Forms the drug of commerce known in Europe as asafoetida—in India as *Hingra*. The process of collection has been variously described by Kœmpfer, Bellow and others. Dr Aitchison's account being the most recent is here given at length.—

The method of collecting the drug as far as I could learn was as follows. A few men employed for the purpose by some capitalist at Herat are sent to these asafoetida bearing plains during June. These take with them provisions consisting of flour and several donkey loads of water melons the latter in lieu of water which is not only scarce there but usually saline. The men begin their work by laying bare the root stock to a depth of a couple of inches of those plants only which have not as yet reached their flower bearing stage. They then cut off a slice from the top of the root stock from which at once a quantity of milky juice exudes which my informant told me was not collected then. They next proceeded to cover over the root by means of a domed structure of from 6 to 8 inches in height called a *khora* formed of twigs and covered with clay leaving an opening towards the north thus protecting the exposed root from the rays of the sun. The drug collectors return in about five or six weeks time and it was at this stage that the process of collecting came under my personal observation. A thick gummy not milky reddish substance now appeared in more or less irregular lumps upon the exposed surface of the root, which looked to me exactly like the ordinary asafoetida of commerce as employed in medicine. This was scraped off with a piece of iron hoop, or removed along with a slice of the root and at once placed in a leather bag—the tanned skin of a kid or goat. My guide informed me that occasionally the plant was operated upon in this manner more than once in the season. The asafoetida was then conveyed to Herat, where it usually underwent the process of adulteration with a red clay *tawah*, and where it was sold to certain export traders called *Kâkris log* who convey it to India. On August 17th when I crossed the great asafoetida plains where this drug is chiefly collected except for the small domes over each root there was not a leaf or a stem or anything left to point to the fact

Asafoetida—Hingra.

(J Murray)

FERULA
foetida.

GUM-RESIN

that any such plant had ever existed there the heat and winds of July and August having removed every trace' (*The Pharmaceutical Journal and Transactions December 11th 1886*)

Bellew in his account says that after cutting the plant through, above the root three or four incisions are made in the stump. The operation of incision is repeated every three or four days so long as the sap continues to exude. Bellew also describes the quantity of asafoetida obtained from each root as varying from a few ounces to two pounds according to the thickness of the roots which vary from the size of a carrot to that of a man's leg. The resin is called by the natives near Herat *angusa*. A particular sort is mentioned by Bellew as being obtained solely from the node or leaf bud in the centre of the root head of the newly sprouting plant. This kind is never adulterated and sells for a much higher price than the ordinary adulterated form. This is probably the fine quality of the drug known as *Khandahari hing*.

The common form or *Hingra* is much adulterated by the *tawah* above mentioned by wheat or barley flour and by powdered gypsum. It is also mixed with slices of the root. The asafoetida obtained from this species of plant with the exception of the *Khandahari Hing* is not used in India. It is nearly all exported to Europe where it forms the drug of commerce.

GENERAL CHARACTERS—The purest kind (*Khandahari hing*) consists chiefly of slightly or not agglutinated tears. *Hingra* or the coarser form exported to Europe varies much in appearance in different samples owing chiefly to adulteration. The pure tears display when fractured a conchoidal surface which changes from milky white to purplish pink in the course of some hours. All samples of the drug have a powerful and persistent alliaceous odour and a bitter acrid alliaceous taste.

CHEMICAL COMPOSITION—Asafoetida consists of resin, gum and essential oil in varying proportions, but the first generally amounts to more than half. The resin is partly soluble in ether or chloroform. The essential oil constitutes about 5 to 9 per cent. of the drug and may be separated by distillation. It is light yellow and has a pungent odour of asafoetida when exposed to the air it evolves sulphurated hydrogen.

The gum occurs in small quantity and is unimportant. An alcoholic tincture of the drug is precipitated by acetate of lead. A solution in sulphuric acid is fluorescent.

Medicine—Asafoetida is used in Europe as an antispasmodic and stimulant but is in much greater demand on the Continent than in Great Britain. In India unlike the allied *Hing* obtained from *F. alhacea*, it is neither used as a condiment nor as a drug.

Food and Fodder—According to Drs. Bellew and Aitchison the plant is used as a food by the natives. Bellew says—The fresh LEAVES of the plant which have the same peculiar stench as the secretion when cooked are commonly used as an article of diet by those near whose abode it grows and the white inner part of the stem of the full grown plant, which reaches the stature of a man, is considered a delicacy when roasted and flavoured with salt and butter. Aitchison writes: He (a native) 'will take out his knife, remove the head, cut the stem from its base, strip off the few sheathing stipules that are still adherent to the stem and in his hand you see what looks like a very large cucumber; from this he will remove the dark-green cuticle, and then slice away at the deliciously cool, soft, crisp copiously milky stem and eat slice after slice. Burns in his *Travels in Bokhara*, states that the YOUNG PLANT is eaten with relish by the people, and that sheep crop it greedily.

Trade.—See the account given under the generic heading

Characters
88Chemistry
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Leaves
91Stem
92Young Plant.
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FODDER
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**FERULA
galbaniflua****Galbanum.**

95

(G Watt)

Ferula galbaniflua, Boiss et Buhse

The drug known from historic times as **GALBANUM** is now believed to be derived from one or two species of **Ferula**, chiefly **F galbaniflua, Boiss et Buhse** **F rubricaulis, Boiss** according to **Boraszczow** is also a source of the drug

Vern — *Bireja ganda birosa* (the last name is also given to the turpentine of **Pinus longifolia**) **HIND** *Badra kama biri jeh* (the gum *jao-shir*) **AVG** *Barsad kuineh* **ARAB**; *Jawashir khassuch gaoshir birees* **PERS**

According to some Muhammadan writers this is the *Khalbani* of the Greeks (*περι χαλβανης* of **Dioscorides**)

References — *Aitchison Pharm Jour and Trans* 3rd Ser XVII p 466 (London 1887) also *Delim Comm Report (Trans Linn Soc III (2nd Series) p 68)* *Dymock Mat Med W Ind* 2nd Ed 390 *Fluck & Hanb Pharmacog* 30 *Bent & Trim Med Pl* 128 *Kew Off Guide to the Mus of Lu Bot* 75

Habitat — A native of Persia from which the gum is imported into Bombay and re exported to Egypt and Turkey **Dr Aitchison** says this is one of the most characteristic plants of certain tracts of the Badghis specially common around Gulran No other plants are to be seen for miles the young leaves on the top of the perennial stems appearing like cushions of moss

GUM RESIN
96

Gum Resin — The *Jao shir* resin as met with in India is not dry agglutinated tears but a yellow or greenish semi fluid resin generally mixed with the stems flowers and fruits of the plant It has an odour between that of Levant Galbanum and Sagapenum It is not used in India **Dr Aitchison** remarks The stem on injury from its earliest stage of growth yields an orange-yellow gummy fluid which very slowly consolidates usually forming on the stem like the grease on a guttering candle and possessing in common with the whole plant when crushed a strong odour resembling that of celery The gum is commonly found adhering to the lower portions of the stem and is so tenacious that when subsequently examined pieces of the plant are frequently found attached to it No artificial means are employed to my knowledge in the collection of this drug It is stated to be an article of export through Persia via the Gulf of Arabia and India

MEDICINE
Gum resin
97

Medicine — The *Jawashir* or (*Gaoshir*) was not identified by the Arabs and Persians with the Galbanum of the Greeks The *Ganda-birosa* of the Indian bazars is the turpentine of **Pinus longifolia** (which see) Muhammadan writers (e.g. the *Makhsan*) describe the Persian *Gaoshir* as a foetid gum resin and say it is used medicinally as an attenuant detergent anti spasmodic and expectorant; prescribed in paralytic affections hysteria and chronic bronchitis (**Dymock**) **Aitchison** writes that in Persia and Afghanistan it is said to be administered to parturient women and the entire shrub is hung round the house to keep off evil spirits whilst parturition is actually taking place

The ordinary Galbanum of European commerce is the Levant resin—for the chemistry of which see the *Pharmacographia*

SPECIAL OPINIONS — § Oil distilled from the gum is used in gonorrhoea it is an excellent substitute for Copaiba (**Surgeon Anund Chunder Mukerji Noakhally**) *Ganda Biroja* I have been told is useful as a topical agent to promote the absorption of inflammatory products it may be employed thus with advantage in bubo and inflammatory enlargements generally (**Surgeon F French Mullen M D, I M S Saadpore**)

Trade — According to **Dymock** *Jawashir* is imported into Bombay from Persia where it is said to be collected between Shiraz and Kirmán

TRADE
98

F 98

Sambal.	(G Watt)	PERULA Sumbul.
The imports are irregular sometimes large quantities arrive Most of it is re-exported to Egypt and Turkey Value Rs per maund of 37½.		
Ferula Jaeschkiana, Vaitke, Fl Br Ind II 708		99 GUM RESIN 100
<p>Gum-resin—The <i>Flora of British India</i> remarks on this species "Regel and Schmalh think that this plant probably produces the Asafoetida of Commerce this may be so as it is an abundant species in Kashmir and very abundantly supplied with oil but it is not the Asafoetida of Linnaeus"</p> <p>It has become customary of late for writers on <i>Materia Medica</i> to abandon all idea of <i>Falconer's</i> Kashmir plant yielding asafoetida This view has been followed above but at the same time it must be admitted that the reports of trade between Kashmir and India regularly show a considerable amount of the drug as obtained from that State This fact may be merely in consequence of its being conveyed from more northern and western regions to India <i>via</i> Kashmir On the other hand so many writers speak of the drug as produced in Kashmir that it may be as well to add that perhaps after all a certain amount of alliaceous resin may be derived from <i>F Narthex</i> or <i>F Jaeschkiana</i> and be employed as a substitute or adulterant for the true drug</p> <p>Dr Stewart in his <i>Punjab Plants</i> mentions that he found <i>Ferula Asafoetida</i> Linn in Khagán Jhelam basin at about 6 000 feet and Oleghorn states that specimens of that plant were brought to him on the Upper Chenab at over 8 000 feet The plant these authors allude to is doubtless <i>F Jaeschkiana</i>. At all events it was found by Aitchison while with the Kuram Valley Force He describes it as covering the ground in the forests between Duk illa and Karatigh and as common on all the hills to the north of Hariab district at 10 000 to 11 000 feet</p> <p>Medicine—Yields a GUM RESIN which Aitchison says is applied to wounds and bruises by the inhabitants of Kuram Valley</p>		
F Narthex, Boiss Fl Br Ind II 707		MEDICINE. Gum Resin 101
<p>Syn—<i>Narthex Asafoetida</i> <i>Falconer Bent & Trim Med Pl, t 126</i> (the description of production and properties of drug there given however most probably chiefly refer to <i>F foetida</i> Regel) <i>Bol Mag t 5168</i> <i>Balfour Trans R Soc Edinb XX, 366 tt 21 22</i></p> <p>Habitat.—Found by Dr Falconer in Astor Baltisthan but apparently never since re-collected</p> <p>Medicine.—It is significant that this species has never been found in Afghánistan a fact which may be assumed as proving the authors incorrect who ascribe to it the Afghán asafoetida Aitchison witnessed the collection of that drug in Afghánistan and brought samples to Europe but the plant from which it was obtained was <i>F foetida</i>, Regel Modern writers have accordingly accepted that discovery as establishing the true source of the Afghánistan asafoetida. Acting on this opinion the writer in the above account of the drug has transferred to <i>F foetida</i> the economic facts hitherto recorded under <i>F Narthex</i>.</p>		102
F (§ Euryangium) suaveolens, Aitch et Hansl Afghan Delim Comm Report		MEDICINE 103
<p>Reference.—<i>Aitchison in Pharm Soc Journ 3rd Ser XVII 407</i></p> <p>Habitat.—Khorasan on the hills to the south of Bezd</p>		104
F (§ Euryangium) Sumbul, Hook f in Bol Mag t 6196 (1875)		105
<p>References.—<i>Flack and Hanb, 312 Bent and Trim Med Pl, 129</i></p> <p>Habitat.—Found on the mountains to the south-east of Samarkand.</p> <p>Medicine.—This and the preceding species are the chief plants which afford the musk scented medicinal root—Sumbul—exported from Persia by the Persian Gulf into Bombay and thence distributed over India.</p>		MEDICINE 106

**FESTUCA
rubra****The Fescue Grasses**

(F F Duthie)

FESTUCA, Linn Gen Pl, III, 1189

A large genus and widely distributed in temperate and alpine regions. Some of the species such as Meadow Fescue and Sheep's Fescue are reckoned amongst the most valuable of European pasture grasses. The generic name is said to be derived from the Celtic word *fest* meaning pasture or food.

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Festuca elatior, Linn

References—Mueller *Select Pl* 173 Sutton *Permanent and Temporary Pastures* pp 36 and 44 Stebler and Schrotter *The Best Forage Plants* (Eng Ed) 35

Habitat—A tufted perennial species with stems upwards of 3 feet met with occasionally on the North West Himalaya. Professor Hackel in his monograph of the Genus divides *F. elatior* into two sub-species *vis pratensis* (the true Meadow Fescue) and *arundinacea* which is a taller and coarser plant.

FODDER.
108

Fodder—Meadow Fescue has a great reputation both in Europe and America as being one of the most valuable grasses for pasture as well as hay. It thrives best in soils rich in humus and where the climate is damp. Cattle are said to prefer it even to Fox tail (*Alopecurus pratensis*).

109

F gigantea, Vill

Syn—BRORNIUS GIGANTEUS Linn

Habitat—This species is found at moderate elevations on the North West Himalaya.

Mueller (*Select Plants* page 174) describes it as a good perennial forest grass.

110

F ovina, Hackel (This includes F ovina Linn)

References—Treasury of Bot I 490 Sutton *Permanent and Temporary Pastures* 45 47 Stebler and Schrotter *The Best Forage Plants* 88 Mueller *Select Pl* 174

Habitat—This species is easily distinguished by its compact growth and close-tufted bristle-like foliage. It occurs abundantly on the Himalaya up to 15 000 feet and in Kashmir. It is extremely variable and has been divided by Professor Hackel into five sub-species and several varieties of which the following are represented in India.

Sub-species *eu ovina*, Hack var *vulgaris*. This is Linnaeus's *F ovina* and the true Sheep's Fescue. According to Sutton it is the smallest grass cultivated for agricultural purposes. Owing to its hard wiry foliage it is useless for hay but being nutritious it affords excellent pasturage for sheep. Another variety of this sub-species is *durinacula* (*F durinacula* Koch) or Hard Fescue, so called on account of the hard nature of the florets when ripe. It has stouter stems, larger spikelets, and thicker leaves than those of the preceding variety and is altogether a more robust plant. It is also a most valuable constituent of sheep pastures in localities where the soil is too poor for the growth of better grasses.

Sub-species *subcata*, var *Valeriaca*, (Hack) is distinguished from the above varieties by having glaucous leaves and stems and the leaves when dry become furrowed.

111

F rubra, Linn**CREeping OF RED SHEEP'S FESCUE**

References—Sutton *Permanent and Temporary Pastures* 48 Stebler and Schrotter *The Best Forage Plants* 107

Habitat—A perennial grass, distinguished from the other species of fescue by its creeping habit. It occurs on the Himalaya at moderate elevations.

FODDER
112

Fodder—This is said to be one of the few grasses which improve as they get older, the leaves and stems being actually more nutritious, as well

F 112

The Fibrous Materials of India.

FIBRES.

as of superior bulk at the time of ripening seed than earlier in the season (*Sutton l c*) It thrives on various kinds of soil; and on loose sandy ground and railway embankments it spreads rapidly by means of its underground stems and serves to bind the soil *Royle* says that, owing to the greater produce it affords it is more valued than *Sheep's fescue*

(*G Watt*)

FIBRAUREA, *Lour* ; *Gen Pl I*, 960

113

Fibraurea tinctoria, *Lour* MENISPERMACEÆ, *Fl Br Ind I*, 98

Syn.—FIBRAUREA TINCTORIA FASCICULATA and CHLOROLEUCA *Miers* ;
COCULUS FIBRAUREA DC MENISPERMUM TINCTORIUM *Spreng*

Vern.—*Tien-sun tan* and *hoang ten* CHINESE ; *Cay-vang dang* COCHIN CHINA

References.—*Lour* vol II 627 ; *Agri Horti Soc Ind Jour XI* 142

Habitat.—An extensive climber found in the forests of Penang Malacca Cochin China and Borneo

Dye—According to many writers the STEMS of this plant afford a permanent yellow dye, which is said to be used along with Indigo to form one of the green dyes of China. It is interesting that the new species indicated below is in Manipur used for a similar purpose

DYE
Stems.
114

F Trotterii, *Watt MS*

Vern.—*Napoo* MANIPUR

115

Habitat.—An extensive climber common in the forests of Manipur The writer (in his Calcutta Exhibition Catalogue) took the liberty of provisionally naming this curious plant in honour of its discoverer the late Major Trotter Political Agent Manipur Not having seen flowering specimens he was however unable to give a detailed description of the plant but as only one species (*F tinctoria Lour*) has been hitherto published, there seems no doubt this will prove distinct

Dye—Major Trotter narrated the process of dyeing from this plant as follows — Five chittacks of dry ROOT of the *napoo* plant to be washed clear and beaten into long shreds then soaked in 2½ quarts of water for 15 or 20 minutes when it will be found that the water has become of a yellow colour this water should be put aside as it will be required later on Take out the pounded roots and re-steep in the same quantity of fresh water and let stand for 24 hours Then wash the cloth to be dyed clean thoroughly soak it in the first solution and take out and repeat the process in the second water leaving the cloth to soak in it for about half an hour then wring out and steep in half a pint of *hesboong* (*Garcinia pedunculata*) water pressing and flopping it about in the vessel so that every part of it may become thoroughly saturated with this water then wring out and dry in the shade

DYE
Root.
116

FIBRES

117

A detailed list of the fibres and fibrous plants of India will be found in the appendix (See the explanation made under FOODS and also DOMESTIC and SACRED PRODUCTS) It may be here stated that fibres are classified into —

I—Vegetable Fibres

A—Bark fibres suitable for the higher textile purposes e.g., *Rhea* (See Vol I 461—484 also Selections from Records of the Government of India Vol I 283—312) *Callotropis* (See Vol II 33—49) *Maradenia* (See Selection from Records of the Government of India Vol I 320—322) Flax, Hemp (*Cannabis sativa*, Vol II 103—126) &c

F 117

**FICUS
annulata****The Banyan Tree.****FIBRES.**

B — Bark fibres suitable for the lower textile purposes e.g. Jute (*See Corchorus Vol II 534—562*) Sun hemp (*See Crotalaria juncea, Vol II 595—614*) and Coir (*Vol II 415—459*) Manilla hemp *Bauhinia* (*See Vol I 424—425, also Selections from Records of the Government of India, Vol I 183—186*) *Hibiscus* &c

C — Bark fibres suitable for Cordage and Ropes (*See Vol II p 566*)

D — Paper materials

E — Flosses e.g. Cotton Silk Cotton Kapok &c &c (*See Selections from the Records of the Government of India I 323—339*)

II — Animal Fibres.

F — Wool (*See Selections from the Records of the Government of India Vol I 29—52*)

G — Silk

H — Hair Pashm &c

III — Mineral Fibres.

I — Asbestos &c (*See Vol I 338*)

Certain information will be found under each of these sectional headings in their respective places in this work but to discover the descriptions of all the fibrous material of India the enumeration given in the appendix must be consulted which will afford the key to the numerous articles on fibres scattered throughout the Dictionary

(Murray & Watt)

FICUS, Linn Gen Pl III 367

A genus of trees shrubs or climbers sometimes epiphytic comprising about 600 species mostly tropical of which according to *Hooker & Flora of British India*, 112 are Indian

The chief interest economically in the species of *FICUS* arises from the fact of their having a milky sap which contains Caoutchouc — *F. elastica* being one of the sources of the India rubber of Commerce

118

Ficus altissima, *Bl Bijl Fl Br Ind V 504 Wight Ic 1 656*

King Ficus 30 1 30 30A 31 82 82¹ URTICACEÆ

Syn. — *F. LACCIFFERA* Roxb, *Wight Ic Brandis Kurz Bedd*; *UROSTIGMA ALTISSIMUM* and *U. LACCIFFERUM* Miq

Vern. — *Bur. ASSAM Kathal bat SYIHET Yokdung LEPCHA; Prab phegran GARO Nyaung (F. laccifera according to Kurz) BURM*

References — *Roxb Fl Ind Ed C B C 641 Brandis For Fl 418 Kurz For Fl Burm II 441 442 Beddome For Man 223 Gamble Man Timb 332*

Habitat — A large spreading tree with few aerial roots Found in the Tropical Himalaya from Nepal to Bhutan in the plains and lower hills of the Deccan and Ceylon and from Assam to Burma and the Andaman Islands According to *Gamble* this tree is epiphytic

Caoutchouc — In the *British Burma Gazetteer* its Caoutchouc is said to be as good as that of *F. elastica*. *Brandis* remarks of it that it merits further examination *Gamble* says it yields caoutchouc more sparingly than *F. elastica*, and of inferior quality In Sylhet lac is collected from the branches of the tree

Structure of the Wood — White, coarse and soft, perishable (*Kurz* under *F. laccifera*).

F. annulata, *Blume King Ficus, p 25, Pl 23, 81 t; Fl Br Ind*

Syn. — *FICUS FLAVESCENS* and *VALIDA* *Bl UROSTIGMA ANNULATUM* and *FLAVESCENS* Miq

Reference. — *Kurz For Fl Burm II 443*

F 121

**CAOUTCHOUC
120**

**TIMBER
120**

121

The Banyan Tree. (Murray & Watt)

FICUS
bengalensis.

Habitat.—A large stem-clasping tree semi scandent Found on the plains and lower hills of Burma

Caoutchouc.—Kurz writes that it yields a rather good quality of Caoutchouc

Structure of the Wood.—Yellowish turning pale brown rather heavy, soft and perishable

Ficus asperima, Roxb Fl Br Ind V 522 Wight Ic 1 633

Syn—F HISPIDISSIMA Wight MS F POLITORIA Murr Cat Ceyl Pl

Vern.—Kilambar GUJ Karakarbūda TEL Khariti khirdi harwat BOMB Khargas KAN Kharaat MAR

References—Roxb Fl Ind Ed C B C 644; Dale and Gils Bomb Fl 243 Bedd For Man 224 Bomb Gas III (Gujrat) 202 XV Pt I (Kánara) 69 King Ficus pp 80 & 81 Pl 100 Dymock Mat Med W Ind 2nd Ed 746, Thwaites Knum Ceyl Pl p 266

Habitat.—A tree or shrub with scabrid shoots Found in Central India and the Deccan and distributed to Ceylon It ascends the hills to a height of 3000 feet

Medicine—Dymock says the JUICE and the BARK are in Bombay well known remedies for glandular enlargements of the abdomen such as liver and spleen

Domestic Uses—LEAVES very rough and used in place of sand paper both in Gujrat and Ceylon In Kánara they are employed to polish horns The YOUNG BRANCHES are said to be jointed and hollow

F bengalensis, Linn Fl Br Ind V 499 Wight Ic 1 1989

King Ficus pp 18 & 19 Pl 13 81

THE BANYAN TREE Eng ARBOR DE RAIS (a tree of roots)
Port

Syn—F INDICA Linn in part (Aman) UROSTIGMA BENGALENSE Gasp

The word Banyan according to Yule and Burnell appears to have been first bestowed popularly on a famous tree of this species growing near Gombroon under which the Banyans or Hindu traders settled at that port had built a pagoda Tavernier speaks of it as the Banyan's tree and describes the village with its pagoda and bathing tanks at which the Hindu traders dwelt Many other early writers describe this as especially the favourite tree of the Banyans or Hindu traders

Vern—Bor bar ber bargat HIND Bar but BENG Bai KOL Boru URIYA Bare SANTAL Ranket GARO; But ASSAM; Borhar NEPAL Kangsi LEPCHA, Bor Mai (SP) Narelli GOND; Wore kurku N W P; Bera bor, bohir bohar bargad (milky juice shir the fibres of aerial roots are rish bargad) PB Baagat bar PUSHTU; Phagwari HAZARA Wur bur SIND Wad vad war barghat BOMB War vada MAR Ala TAM Mari peddi mari (marri) TEL; Ahlada, alada ala alawa KAN; Peralu peralim MALAY; Pyi-nyoung (panyaung or pyinyauing) BURM; Maha nuga (a l TAM in Ceylon) SINGI Vata SANS

References—Roxb Fl Ind Ed C B C 639 Brandis For Fl 412 Kurz For Fl Burm II, 440, Beddome For Man 222 Gamble Man Timb 333 Dale & Gils Bomb Fl 240, Stewart Pb Pl 213 Sir W Jones V p 160, Cleghorn 147 197, Rheede Hort Mal, I 1 28 Trimen Cat Ceyl Pl p 84; Elliot Fl Andh 113 Mason Burma and Its People 450 776; Voyage of John van Linschoten II 53 to 58 Pharm Ind 217; Ainslie Mat Ind II 10 O'Shaughnessy Beng Dispens 577; Mooden Sheriff Supp Pharm Ind., 142; U C Dutt Mat Med Hind 323 Dymock Mat Med W Ind 2nd Ed 745; Murray Pl and Drugs Sind 31; Med Top Oudh 4, 6; Report on the Fibres of India, by Cross Bevan King and Watt p 53; Baden Powell Pb Pr 377; Atkinson Him Dist 737; Drury U Pl 212, Lisboa U Pl Bomb 129 204 235 261 278 279 283 290 291; Liotard Paper making Mat 34, &c Watson Report on Gums 65; Indian Forester

CAOUTCHOUC

I22

TIMBER

I23

I24

MEDICINE.

Juice,

I25

Bark

I26

DOMESTIC

Leaves

I27

Young

Branches.

I28

I29

**FICUS
bengalensis****The Banyan Tree.**

I 274 III 205, 236 V 15 212; VI 218 240; IX 247; X 33 325; XII, App 21 XIII 121 551 Balfour Cyclop I 1100 Smith Dic 36 Kew Reports 1879 34 Kew Off Guide to the Mus of Ec Bot 122; Kew Off Guide to Bot Gardens and Arboretum 41 Journ Agri Hort Vol IV 128; V 20 VI 71 VIII 102 Journ Agri Hort Soc 1885 Vol VII New Series 263 276 For Ad Rep Ch Nagpore 1885 6 33 Gasetteers Orissa II 179 App VI Bomb., II 39 V 23 285 360, VI 13; VII 36 38 43, XI 26 XII 25, XIII 27 XV, 69 XVI 16 XVII 25 Panjab—Karnal 16 Musaffargah 23; Hoshiarpu 10, Hasara 13, Ludhiana, 10 Jhang 17 N W P — Bundelkhand I 84 Agra IV lxvii Mysore and Coorg Vol I 49 70 II 8 III 24 Manuals Cuddapah Dist p 263 Buchanan's Statistical Account of Dinajpur 164 Settlement Report South Arcot 34, Kohat 29 Guwrat 134 Ieshawar 113 Kangra 22; Shajehanpur IX; Seonee 10 Bastool 127 Chindwara 110 Nimar 307

Habitat—A large tree wild in the Sub Himáláyan tracts and lower slopes of the Deccan planted throughout India Mr J Cameron writes that this tree is so common in Mysore that it may be said to be characteristic of the arboreal vegetation in many parts of that province

It attains a height of 70 to 100 feet and sends down roots from its branches thus indefinitely expanding its horizontal growth The branches from which these roots descend may often be seen to increase in thickness as they spread away from the central axis and here and there this occurs to such an extent as to form auxiliary stems The tree originates usually from the germination of seeds dropped by birds on other trees Very often owing to the natural receptacles formed by the axils of the leaves of palms (particularly the Palmyra and Date) this Fig may be observed embracing until it strangles a crown of palm leaves which are seen to grow from the centre of the Banyan The death of the supporting palm leaves a decaying central mass which in time (or with the maturity of the Banyan) results in the death of the original axis but the daughter axes continue their forest like expansion until an area is embraced sufficient to afford shade for many thousand people Colonel Sykes described a very large Banyan which grew on an island in the River Nerbudda This was known as the Kabir bar and was probably the large tree described by Nearchus In the Poona Gasetteer (Vol XVIII Pt I p 54) a Banyan is spoken of in the Andhra valley so large as to afford shade to 20 000 people Forbes describes its circumference as of 2 000 feet and its overhanging branches beyond the daughter stems as stretching over a much larger area It had about 320 large trunks and over 3 000 smaller and was capable of sheltering 7 000 men High floods have however since carried away portions of the island and with these sections of this great tree Better known examples are the famous Banyan in the Royal Botanic Gardens Calcutta, and the Satara one in Bombay Dr King describes the Calcutta banyan as about 100 years old and as possessing 232 aerial roots. The main or parent trunk of this remarkable tree, he says, has a girth of 42 feet the circumference of its leafy crown being 857 feet It is, however still growing vigorously and as Dr King remarks there is no reason why it should not go on increasing indefinitely It is known to have taken its birth about the year 1782, on a sacred date-palm Mr Warner describes the Satara banyan—a still larger example than the Calcutta one. In 1882 its circumference was 1 587 feet its length from north to south 595 feet and from east to west 442 feet

The Banyan is a favourite road side tree and is accordingly largely planted for shade In the Panjáb the young trees are said to require protection from frost Both this tree and *F religiosa* effect serious destruction to buildings, especially in Bengal Bird-droppings containing the seeds from the fruits germinate on the walls of temples and other buildings,

The Banyan Tree (Murray & Watt)

FICUS
bengalensis.

and owing to the superstition of the people these can only be removed provided injury be not done to the plants (*Buchanan*) *Valentia* (1809) speaks of this tree as the greatest enemy to buildings

In Ratnagiri the Banyan trees were subjected to a tax owing to the number of the oil bearing seeds of *Calophyllum inophyllum* dropped by the flying foxes who lived in the Banyan trees—the owners of these trees not being allowed to participate free of duty while the owners of *Calophyllum* trees were taxed (*Bombay Gazetteer Vol X* 39)

Caoutchouc—It yields an inferior rubber and the milk is by the natives made into bird lime Lac is often collected from the tree Dr Buchanan describes the preparation of this bird lime The milky juice 'he says coagulates into a kind of elastic gum It is collected by making incisions in the branches is strained and mixed with $\frac{1}{4}$ of its weight of mustard seed oil It is then fit for use

Fibre—A coarse rope is prepared from the BARK and from the AERIAL ROOTS Paper is also reported to have been formerly largely prepared in Assam from the bark and to a small extent it is still so prepared at Lakhimpore and in Bellary in Madras This fibre was used by the Sikhs as a slow match The length of the ultimate fibres has by Cross Bevan and King been ascertained to be 1—3 mm The fibres obtained from the genus *Ficus* contain from 40 to 60 per cent of cellulose and under hydrolysis lose from 20 to 40 per cent of their weight Chemically they are therefore worthless fibres (*See F infectoria* and *F religiosa*)

SPECIAL OPINIONS AS TO FIBRE—§ The inner bark is an article of common use for cordage &c in the rural districts (*J Cimeron Superintendent Botanical Garden Bangalore*) Used for tying bundles of wood &c (*Dr Dymock Bombay*)

Medicine.—The MILKY JUICE is externally applied for pains and bruises and as an anodyne application in rheumatism and lumbago It is considered as a valuable application to the soles of the feet when cracked or inflamed and is also applied to the teeth and gums as a remedy for tooth ache An infusion of the BARK is supposed to be a powerful tonic and is considered to have specific properties in the treatment of diabetes The SEEDS are deemed cooling and tonic The LEAVES are applied heated as a poultice to abscesses and after they have turned yellow are given with roasted rice in decoction as a diaphoretic The ROOT fibres are given in gonorrhœa in the Panjáb being considered by *Bedaks* to resemble *Sarsaparilla*.

SPECIAL OPINIONS—§ An infusion of the small branches is useful in hæmoptysis (*Civil Surgeon J Anderson M B Bijnor*) The tender ends of the hanging roots are given for obstinate vomiting (*Surgeon Major Robb Civil Surgeon Ahmedabad*) The concentrated juice is much used by natives in combination with fruit as an aphrodisiac also in spermatorrhœa and gonorrhœa (*Narain Misser Kothe Basar Dissensary Hasaribagh*) The young buds are said to be astringent and useful in diarrhœa (*Civil Medical Officer U C Dutt Serampore*)

Really useful in cracked heels (*Assistant Surgeon Shih Chunder Bhattachary Chanda Central Provinces*) A small quantity of the milky juice is taken early in the morning in dysentery The milky juice is a good astringent (*Surgeon W F Thomas Madras Army Mingalore*)

Food and Fodder—The small red FIGS are often eaten by the poorer people especially during times of scarcity Though much eaten by birds they are said to be poisonous to horses (*Bomb Gas XVIII Pt I, p 54 Vol XVII 27*) The LEAVES and YOUNG TWIGS are greedily eaten by elephants and cattle are also said to eat them *Linschoten* alludes to the fact that in his time the leaves of this tree were given to elephants (*ibid*, in 1596).

CAOUTCHOUC
I30FIBRE
Bark
I31
Aerial roots.
I32MEDICINE.
Juice
I33Bark.
I34
Seeds.
I35
Leaves.
I36
Root
I37FOOD.
Fruit.
I38
FODDER
Leaves.
I39
Young twigs.
I40

FICUS
Benjamina
The Banyan Tree.
TIMBER
141

Structure of the Wood.—Grey moderately hard no heartwood Weight about 37lb It is of little value but is durable under water and therefore used for well curbs It is sometimes employed for boxes and door panels The wood of the drops is stronger and is used for tent poles cart yokes and banghy poles (*Gamble*) Kurz and Brandis describe the wood as whitish open grained and soft

DOMESTIC
Leaves
142
Juice
143
SACRED
144

Domestic Uses—The LEAVES are much in demand as plates The milky JUICE is in Lahore employed to aid in the oxidation of copper

Sacred Uses—According to Hindu mythology Brahma was transformed into a *Vada* tree Dr Buchanan says that the Banyan is viewed as the male to the Peepul It is regarded as a sin to destroy either of these trees but more especially the male It is meritorious to plant a young male close to the female and this is done with a ceremony somewhat similar to that of marriage It is customary he adds to place a piece of silver money under the roots of the young Banyan tree So superstitious are the Hindus against cutting down the Banyan tree that a Mr T Marsden of the Madras Engineers is said to have been poisoned by the Brahmans of Triplassore in 1771 because he had cut down a Banyan tree during the construction of the fort Lisboa writes that the dry twigs are used as *Samidhas* for producing sacred fire The leaves are employed as one of the *Panch pallavs* or platters and also for pouring libations In the *Vratrag* females are ordered to worship this tree on *Jesht shukh* 15th (May) to water it to wind a thread round it and to worship it with *gandh* flowers &c (?the Indian Marigold—see Vol II p 24 and p 272 also *Tagetes erecta* On the Himálaya the introduced but now completely naturalised *Dahlia* is similarly used) They are further ordered to make *Pradakshanas* i.e. to go round it a certain number of times to praise it and to pray to it for the survival of their husbands and for the fulfilment of their wishes) They are told that by worshipping this tree they attain one of the heavens—*Shivloke* They are encouraged to this worship by the tradition that *Savitri* the wife of *Satyawan* got back her deceased husband through the adoration of this tree They are recommended to perform the thread ceremony of this tree and its marriage with the *Durva* plant—*Cynodon Dactylon*

The umbrella poles often used at ceremonies are made of the wood of the aerial roots and the young thin roots are by the Santals and other aboriginal tribes of Chutia Nagpur wound around the neck as a charm to ensure conception

145

Ficus Benjamina, Linn Fl Br Ind V 508; Wight Ic t 658

Syn—FICUS COMOSA Roxb Beddome Wight Ic F PENDULA Link
 F PAPYRIFERA Griff Icon 11 As t 554 UROSTIGMA NUDUM Miq
 U BENJAMINA Miq FICUS NUDA Miq F BENJAMINA Linn
 var COMOSA Kurz

Vern—Sunonjar SANTAL; Juriyakri, ASSAM Kabra NEPAL Kunhip
 LEPCHA; Pimpr BOMB; Yili CHUTIA NAGPUR Putra jawoi TEL
 Yili MALAY Nyaung thabieh IBURM

References—Roxb Fl Ind Ed C B C 644 Brandis For Fl 417
 Ku s For Fl Burm II 446 Beddome Fl Sylv II 223, Gamble
 Man Timb 338 Dals & Gibs Bomb Fl 242 King Ficus 43
 Elliot For Andhr 161 Drury U Pl 214 Gamble Trees Shrubs
 &c Darjeeling 74

Habitat—A moderate-sized evergreen often epiphytic tree cultivated in the Malay Peninsula wild (var *comosa* only) along the base of the Eastern Himálaya to Assam Chittagong Burma the Andaman Islands and the Deccan

Medicine—According to Drury a decoction of the LEAVES mixed with oil is believed in Malabar to be a good application to ulcers.

MEDICINE
Leaves
146
F 146

The Fig

(Murray & Walt)

FICUS
Carica.

Structure of the Wood.—Grey beautifully mottled moderately hard
Weight 34lb per cubic foot

Lac.—Gamble writes that lac is produced on this species in Assam

Ficus Carica, Linn Brandis For Fl 418 Aitchison Afgh
THE FIG [Delim Rept Pl 46]

Vern.—Anjr HIND Anjr BENG Kimri fagu faguri faguri Pa ;
Anjr BOMB Anjr GU7 Anjura or anjuri KAN Tie ihu BURM ;
Anjura SANS Ten ARAB Anjr PERS

References.—Roxb Fl Ind Ed C B C, 635 Gamble Man Timb 333
Stewart Pb Pl 211 DC Origin Cult Pl 295 King Ficus 147
Filiot Flora Andhr 15 Stocks Acc unt of Sind, Aitch Afgh Del
Com 109 Lace Quetta Pl Ainslie Mat Ind I 131 U C Dutt
Mat Med Hind 291 Dymock Mat Med W Ind 2nd ed 745 Fluch
& Hanb I pharmac 542 S Arjun Bomb Drugs 127, Irvine Mat
Med Patna 117 Atkinson Him Dist 736 Lisd a U Pl Bomb 130
17 Birdwood Bomb Pr 176 Atkinson Kc Prod N W P Pt
V 44 83 Mason Burma and its People 459 776 Ayres Abbott
(Gladwin's Trans) I 83 Smith, Dic, 172, Kew Off Guide to the Mus
of Kc Bot 122 Kew Off Guide to Bot Gardens and Arboretum 145
Settlement Reports Ieshawar 13 Kohat 39 Hasara 94, Kungra 22
Gujrat 135 Delhi 27 Fort Blair 33 Gazetteers N W I Bundel
khand I 84 Agra IV lxxii Bombay Kathawar VIII 184,
Poona, XVIII 41 Mysore a d Coorg I 53 70 Bannu 21, Dera
Ismail Khan 19, Ieshawar 28, Special Reports from Govt of Burma
from Collector Biliary from Collector Cuddapah Madras Board of
Revenue Jan 1 1889 No 266 p 5 and Director of Land Records
and Agriculture Bombay

Habitat.—Cultivated in many parts of India more especially in the
North Western Provinces the Panjáb the Western Himalaya, Sind and
Beluchistan Reports have been received of its cultivation in Bombay
Madras Burma and the Andaman Islands In some of the references
however room for doubt seems to exist as to their really referring to this
species Dr Aitchison thinks *F Carica* is probably a native of Afghanis-
tan and Persia It is indigenous he says in the Badghis country and
Eastern Persia According to DeCandolle the prehistoric area of the
fig tree covered the middle and southern part of the Mediterranean basin
from Syria to the Canaries He further mentions the fact that leaves
and even fruits of the wild *Ficus Carica*, with teeth of *Elephas primigenius*
and leaves of plants of which some no longer exist and others like *Laurus*
canariensis which have survived in the Canaries were found by Plan-
chon in the quaternary tufa of Montpellier and by de Saporta in those
of Ayalades near Marseilles, and in the quaternary strata of La Celle
near Paris

Cultivation.—In the Bombay Experimental Farm reports repeated men-
tion is made of the cultivation of this fig but the following special report by
the Director of Land Records and Agriculture, Bombay gives the results of
the experience gained at Poona —

In 1887-88 the area under figs amounted to 271 acres With the ex-
ception of a few acres in Surat, Ahmadnagar and Belgaum almost the
whole area was confined to Poona There are two varieties—dark purple
and greenish The tree grows from 6 to 7 feet high

The fig tree does not require very rich soil Alluvial or loamy soil of
yellow or reddish brown colour with a rocky or *murum* bed 3 or 4 feet
below the surface is best suited to its growth. The rocky or *murum* bed
prevents the roots from penetrating deep into the soil and favours the
side growth of rootlets which is very desirable Fig trees also thrive
in clayey soil, but the land must not be water-logged Rich black soil is

TIMBER.

147
LAC.
148
149

CULTIVA-
TION
150

F. 150

**FIGUS
Carica****The Fig****CULTIVA
TION**

unsuited to fig trees. In it the plant grows tall and runs to leaf and the fruit is much inferior both in size and taste.

The crop requires a mixed manure about 10 to 12 cart loads for the first year. The ingredients of the mixture are town sweepings, sheep-droppings, cowdung and ashes. The use of each of these ingredients separately is considered prejudicial. Sheep droppings make the skin of the fruit tender so that it comes off at a touch. Cowdung causes a disease which injures the tree. The use of ashes by themselves is considered injurious to the plant. Dry fish forms a very good manure but is not easily procurable. Poudrette has not yet been tried.

The plants are raised from cuttings $\frac{1}{2}$ to 1 inch thick and a foot and a half long, planted in rows 10 to 12 inches apart in a richly manured and watered plot. The cuttings should be put into the ground in June after the monsoon has set in and should be watered every eighth, sixth or fifth day as necessary. In about two months they begin to throw roots and shoots and make a few leaves. If they are properly taken care of the plants after a year become fit for transplantation; otherwise they take from 10 to 12 months more. The best season for transplanting is July-August. To allow of free growth and to prevent the tangling of branches and injury from shade the plants should be at least 12 to 14 feet apart. About 200 plants go to an acre.

At the end of every August when there is a break in the rains the soil at the roots of the plants should be turned up and loosened, the outstretching roots cut and the remaining roots exposed to the sun for four or five days. The roots should then be covered with a little earth and one or two basketfuls of manure and the plants watered. The whole operation should not extend over a fortnight. A little manure is sometimes applied but none should be given after October. From the beginning of March to the end of May the soil should be slightly turned and cleared every fortnight. In this way the soil should be dressed about 20 to 25 times a year. If the plant turns to wood and leaf and does not bear it should be pruned slightly, manured and watered every eighth day.

The fig tree requires careful watering. In the fruiting season the failure of a single weekly watering reduces the outturn. The quantity of water should also be gradually increased and the period between two waterings should begin with four days and end with eight days, having an intermediate period of six days. The watering should commence with September and end with the fruiting season. During the first two years light crops may be raised between the lines of fig trees. In the first year onions, garlic and other vegetables may be cropped and in the second year radish and fenugreek. But from the third year when the plant begins to bear no crop should be raised. The plant begins to bear in the second or third year after transplantation. But the full crop can be gathered only from the fourth year. The tree continues to bear from 12 to 15 years and 20 years is the utmost limit after which the tree generally dries up. Vigorous growth of the plant in September-October is a sure indication of a good crop. The tree fruits twice a year. The first season commences in June-July but the crop is not allowed to ripen as it besides being sour in taste injures the second crop which is by far the most valuable. The first crop is gathered green and is sold as an inferior vegetable. The second season commences in January and lasts till the commencement of the monsoon. The first takes about two months to mature. If a tree has fruited too thickly to allow all the fruits to attain good size, the crop is thinned. But this thinning must be done by experienced hands. A full grown tree, which is 6 to 9

The Fig	(Murray & Watt)	FICUS Cunia.
feet high, yields according to season from 2 to 20lb of fruit Excessive heat or cold and cloudy weather cause great injury to the tree and fruit Two blights, locally called <i>dhui</i> and <i>moosa</i> often cause considerable injury to fig gardens from October to December		CULTIVA- TION
The first year's expenses for an acre of fig garden as shown below amount to Rs 75 to Rs 90 —		
Cost of 200 plants	R to R 12 14	
Planting charges	5 6	
Manure 10 to 12 cart loads	12 15	
Watering and other charges	46 53	
	75 to 90	
If no hired labour were employed these charges would be reduced to Rs 50 In the second year about Rs 50 and in the third year about Rs 80 to 100 are required In the third year the produce is worth from Rs 50 to Rs 100 from the fourth to the tenth year the income of an acre of fig garden varies from Rs 300 to Rs 400 against an expenditure of about Rs 100 In the Poona bazar fresh figs sell from 4 to 12lb per rupee		
'Figs are eaten fresh They are preserved in sugar but are never dried Large quantities of Poona figs are exported to Bombay They are believed to increase blood and to have a cooling effect on the system'		
Medicine —The dried FRUIT is demulcent emollient nutritive and laxative It is however only rarely employed medicinally Persons suffering from habitual constipation find it useful as an article of diet The fruit is also used in the form of a poultice to effect suppuration The PULP of the fig mixed with vinegar and sugar is very useful in bronchitic affections principally in children (<i>Dr Emerson</i>) <i>Flückiger</i> and <i>Hanbury</i> say the dry fig contains about 60 to 70 per cent of grape sugar and the unripe fruit starch <i>Ansle</i> remarks that the <i>Vytians</i> prescribe figs in consumptive cases The Arabians place them among their <i>Mobehyat</i> or aphrodisiacs and <i>Musjat</i> or suppurantia Smyrna figs are deemed the best		MEDICINE Fruit. 151
Food —From Afghanistan FIGS of a better quality than those grown in India are imported into the Panjab in considerable quantities annually The fruit is however not uncommonly offered for sale but it is eaten chiefly by the Natives The fresh figs of India are inferior to those of Western Asia.		Pulp 152
SPECIAL OPINIONS § — The JUICE of the LEAVES is of use when applied locally in the early stages of leucoderma (<i>Narasim Misser Kithi Basar Dispensary Hoshangabad Central Provinces</i>) Largely imported from the Persian Gulf ports (<i>W Dymock Bombay</i>)		Juice 153
Food —From Afghanistan FIGS of a better quality than those grown in India are imported into the Panjab in considerable quantities annually		Leaves. 154
The fruit is however not uncommonly offered for sale but it is eaten chiefly by the Natives The fresh figs of India are inferior to those of Western Asia.		FOOD. Fruit. 155
Ficus chittagonga , <i>Miq</i> see <i>F glomerata</i> <i>Roxb</i>		
F cordifolia , <i>Roxb</i> see <i>F Rumphii</i> , <i>Kurs</i>		
F Cunia , <i>Ham Fl Br Ind V 523 Wight Ic t 669</i>		156
Syn. — <i>FICUS CONGLOMERATA</i> <i>Roxb</i>		
Vern. — <i>Khewnau</i> , <i>khurhur</i> <i>hassa ghni khenan ghni</i> <i>HIND Dumbur jayya-domur</i> <i>BENG Rima sin</i> <i>KOL Porok podha</i> <i>CHUTIA NAGPUR; Horpodo</i> <i>SANTAL; Kankya</i> , <i>NEP L Sa gyi</i> <i>LEPCHA Kanai palkai taikrau</i> , <i>MICHI Poroh perina, teregam</i> <i>MAL (SP) Kunia KUMAON; Kathyular trumbal karndol kuri</i> <i>PB Porodumer KHARWAR; Ye-kha ong ye-kha-ong</i> <i>BURM; Jonua sodoi</i> <i>MAGH</i>		
References. — <i>Roxb Fl Ind Ed C B C 546, Brandis For Fl 221; Kurs For Fl Burm II, 461 Beddome Fl Sylva 224, Gamble Man Timb 339; Stewart Pb Pl 212, Rev A Campbell's Report on the Econ Prod., Chutia Nagpur Atkinson, Him. Dist, 318 Ec Prod.,</i>		
		F 156

**FICUS
foveolata****The Caoutchouc of Indian Commerce.**

N W P Pt V, 84 Report on the Shan States by Mr Aplin For Ad Report Chutia Nagpur 1885 6 33 Ind For III 205 VI 218; VIII 82 X 222 325 XI 4 Bom Gas III 202

Habitat—A moderate sized tree of the sub Himálayan tract, from the Chenab eastward to Bengal and Burma ascending to 4000 feet in altitude

Gum—Lac is produced on the tree

Fibre—The BARK is used to tie the rafters of native houses Mr Campbell says it affords a good strong fibre useful for ropes

Medicine—The FRUIT is given in apthous complaints A bath made from the fruit and BARK is a cure for leprosy (*Rheede*) The juice from the ROOTS is given in bladder complaints and boiled in milk in visceral obstructions (*Rev A Campbell*)

Food—The FRUIT is eaten and is said to be good though somewhat insipid According to Stewart however it is not eatable

Structure of the Wood—Rough moderately hard greyish brown Weight 31lb per cubic foot It is not used economically

Domestic Uses—The LEAVES are rough and are consequently employed in place of sand paper

[54 Wight Ic 663

Ficus elastica, Roxb ; Fl Br Ind V 508, King Ficus p 45 Pl

Syn—UROSTIGMA ELASTICUM *Miq* ; VISIANIA ELASTICA *Gasp*

Vern—*Bar, attah bar* BENG ; *Kagire hasmır* KHASIA ; *Bar attah bar* ASSAM ; *Kauhet* GARO *Lesu* NEPAL *Yoh* LEPCHA ; *Nyaung bawdi* BURM

References—*Roxb Fl Ind Ed CBC 640 Brandis For Fl 417 Kurz For Fl Burm II 444 Gamble Man Timl 336; Stewart Pb Pl 212 Mason Burma and its People 523 776 Lisboa U Pl Bomb 130 Christy Com Pl and Drugs VI 53, VII 25 Liotard Dyes 33 Watson Report on Gums 34 Kew Off Guide to the Mus of Fc Bot 122 Kew Off Guide to Bot Gardens and Arboretum 69 Bomb Gas 404, Burm Gas 124 Trans Agri Hort Soc Vol IV 221 Indian Forester I, 86 124 126, 127 129 132 133 134, 136 138 139-141 188 III 46 IV 40 41 V, 190 VI 49 50 VII 101 241 243 VIII 203 IX 225, X, 403 XI 256, 354 485 487 XII 563 XIII 550 XIV 297 Special Reports Conserv Forests South Circle Madras Conserv South Circle Bombay Conserv of Sind Conserv of Bengal (Chittagong) Official Correspondence and Reports Assam Forest Reports from 1873 74 to 1887 88*

Habitat—A large evergreen tree usually epiphytic throwing down numerous aerial roots from the branches It occurs in damp forests from the base of the Sikkim Himálaya eastward to Assam and Arracan There are large Government plantations in Assam and it is also being cultivated in other provinces Kurz remarks that it is frequent in Upper Burma where whole forests of the species are said to exist in the valley of Hookhoom

For the cultivation of this and other Caoutchouc yielding plants see the account under INDIA RUBBER

Gum—The tree yields the Caoutchouc of Indian commerce

Structure of the Wood—White or light brown Weight 43lb per cubic foot It is not used

F foveolata, Wall Fl Br Ind, V, 528, King Ficus p 133-135 Pl II 166 167, and 168 Griff Icon Pl As t 561

Syn—FICUS PUBIGERA Wall ; Brandis Kurz ; F EREATA *Miq* (non Thunb) F THUNBERGII Maxim F IMPRESSA Benth ; F LUDUCCA Roxb F LUDENS, Wall ; F WRIGHTII, Benth

Vern—*Dudika*, NEPAL ; *Takot* LEPCHA ; *Bat phagar nágér jamán thaur, phogr, dúdagrá, mambro, dagurá, shirálé, mathágar, karmbal*

F 168

GUM
157
FIBRE
Bark
158
MEDICINE
Fruit
159
Bark
160
Roots
161
FOOD
Fruit
162
TIMBER
163
DOMESTIC
Leaves
164
165

GUM
166
TIMBER
167
168

A Powerful Aperient. (Murray & Watt)

FICUS
glomerata.

garali (these names are given by Stewart for *F. reticulata*, Miq, which Brandis regards as *F. foveolata*, Wall) PB; *Grelu* SIMLA; *Makruu* KUNAWAR.

References.—Brandis For Fl 423 424 Kura For Fl Burm II 450
Gam'le Man Timb 339 Stewart Pb Pl 214.

Habitat.—An evergreen scandent shrub found in the Himálaya from Chumba to Bhutan altitude 2000 to 7000 feet, also the Khasia Hills and Burma

Fodder.—Stewart says of his *F. reticulata* that it is browsed by goats

Structure of the Wood.—Light brown soft very porous Weight 38lb per cubic foot

FODDER
160
TIMBER.
170
171

[2 Wight Ic 1 650 651 652
Ficus gibbosa, Blume Fl Br Ind V 495 King *Ficus* 4 Pl

Syn.—*F. UNIGIRRA* Miq, *F. RIGIDA* PARADOXA and *CINEATA* Blume;
F. ALTIMERALLOO Roxb MSS *F. EXCELSA* Vahl ? in Roxb Fl
Ind Kura For Fl Burm

The *Flora of British India* describes four varieties of this plant as follows —

α *F. gibbosa* Blume Malay Peninsula

β *F. cuspidifera* Miq Throughout India

Syn.—*F. EXCELSA* Wall *F. RETICULOSA* Miq

γ *F. parasitica*, Koen Central India Behar &c

Syn.—*F. AMPLOS* Koen *F. SCLEROPHYLLA* Roxb *UNOSTIGMA*
VOLUWILE Dals *U. AMPLOS* Dals & Gibbs

δ *F. tuberculata*, Roxb Western Ghats

Syn.—*F. ANGULATA* Miq

Vern.—*Datir* BOMB *Umbar* GUZ *Kouda jéoor* tellabarinka TEL;
Attiméralu MALAY; *Udumber* SANS

References.—Roxb Fl Ind Ed C B C (under four specific names)
641 643 644 Brandis For Fl 420 Kura For Fl Burm II 451
Beddome Fl Sylv 224, Dals & Gibbs Bomb Fl 242 315 Dymock
Mat Med W Ind 2nd Ed 746; Drury U Pl 216 Balfour Cyclop
1100

Habitat.—This protean species the *Flora* describes as a tree met with at the bases of the hill ranges throughout India from Kumaon eastward to Burma and southward to the Malay Peninsula Andaman Islands, and Ceylon Distributed to the Malay Islands Hong Kong &c

Medicine.—The decoction of the root acts as a powerful aperient. The root bark is stomachic and gently aperient (*Dymock*)

Domestic Uses.—LEAVES used to polish ivory (var *parasitica*, Roxb)

F. glomerata, Roxb Fl Br Ind V 535; Roxb, *orom* Pl
II No 123 Wight Ic 667 King *Ficus* pp 173 174 Pl.,
218 219; Brandis For Fl Pl 49

Syn.—*F. CHITTAGONGA* Miq, *F. RACEMOSA* Wall (non Roxb) *F. MULLIS* Miq (non Vahl) *F. GOOLEREEA* Roxb *COVELLIA GLOMERATA* Miq

Vern.—*Gular paroa* *leika umar umrai, tue dimers* HIND; *Yagya du mar* (Gamble) *Yaynadumbar* (U O Dutt) BENG; *Iowa, Ioa* KOL *Iowa Ioa* SANTAL *Dumer* CHUTIA NAGPUR; *Dimeri* URIYA; *Dumeri* NEPAL *Tchongtay* LEPCHA *Dumer* MAL (SP); *Thoja* GOND *Alawa*, KURKU; *Dumer*, KHARWAR; *Gular panwa, lelha*, N W P; *Kathgular krumbal rumbal balbar palab, kakammal dadhuri* PB *Ormul* PUSHTU *Umbar gular* C P; *Umbar*, BOMB; *Umbara atti rumadi* MAR *Umbar*, GUZ *Atti* TAM; *Moydi atti bodda paidi mari medi* TEL *Kulla kith, atti* (the gum is called *Chandarasa*) KAN; *Ye-tha-pan*, (*yao-tha-phan*, Mason), BURM; *Attosha*; SING; *Udumbara* SANS.

MEDICINE.
Root.
176
Root-bark
177
DOMESTIC
Leaves.
178
179

**FICUS
glomerata****The Chandarasa Gum**

References—*Roxb Fl Ind Ed BCC 646 659 Brandis Fo Fl., 422 Kurr For Fl Burm II 458 Beddome Fl Sylu, 224, Gamble Man Timb 359 Thwaites En Ceylon Pl 267 Dals & Gibs Bomb Fl 243 Stewart Pb Pl, 212; Rev A Campbell Rep Econ Prod Chutia Nagpur No 7531; Elliot Fl Andh 18 28 114, 141 Mason Burma and its People 460 776, Sir William Jones V 159 No 72 Ainslie, Mat Ind II 30 U C Dutt Mat Med Hind 235 321 324 Dymock Mat Med W Ind 2nd Ed, 744 Baden Powell Pb Pr 377 Atkinson Him Dist 317 737 N W P Econ Prod Pt V 84; Lisboa U Pl Bomb, 131 204 278 282 290 McCann Dyes and Tans Beng 136 144 Watson Report on Gum 61 Special Report Baroda Durbar, No 109 Balfour Cyclop I 1100 Journ Agri Hort 1885 VII (New Series) 276 Indian Forester I 23 273 III 205 236 IV 321 V 471 VII 232; VIII 35 411 IX 222 325 XII App 21, 28 XIII 121 XIV 144 371 Settlement Reports N W P Shahjehanpur p ix C P Chindwara 110 Seonee 10 Bastool 127 Chanda App VI, Bhundara 19 Hoshungabad, 179, Nimar 307 Raepur 76 77, Punjab Simla App II p xiv Kohat 29—30 Peshawar 26, Manuals and Gasetteers Trichinopoly 78 Coimbatore 247 Orissa II 179, App VI Bombay III 199, V 283 VII, 38 40 43 XI 24 XII 28 XIII, 27 XV 69; XVI 16 XVII 26 Mysore and Coorg I 70 434; N W P III 33 248 IV., LXV; For Admn Rep Ch Nagpur 1885 633*

Habitat—A large tree of the Salt Range and Rajputana along the sub Himálayan tracts to Bengal Central and South India Assam and Burma

Gum—In Chanda it is said a gum (*sic*) is obtained from this tree (*Settle Report*) The *Mysore and Coorg Gasetteer* referring probably to the same substances says a gum known as *Chandarasa* is prepared from the milky juice In both these passages the word *Caoutchouc* should probably be substituted for *gum*

The lac insect is reported to occasionally frequent the tree *Brandis* remarks that it abounds in a milky juice from which bird lime is prepared

Dye—This tree is said to afford a dye (*C P Gas 419*) *McCann* says that the bark under the name of *goolur* is mentioned as one of the ingredients used in Lohardagá in preparing a good black dye

Medicine—The LEAVES BARK and FRUIT are employed in native medicine. The bark is given as an astringent and a wash for wounds It is also employed to remove the poison from wounds made by a tiger or cat The ROOT is useful in dysentery and a fluid obtained from it by incision is administered as a powerful tonic *Ainslie* speaks of this fluid as *attis vnyrtannis*—a powerful tonic when drunk for several days together The leaves reduced to powder and mixed with honey are given in bilious affections The small blister like GALLS common on the leaves soaked in milk and mixed with honey are given to prevent pitting in small pox (*Atkinson*) The figs are considered astringent stomachic and carminative and are given in menorrhagia and hæmoptysis The MILKY JUICE is administered in piles and diarrhoea and in combination with sesamum oil in cancer The fresh juice of the ripe fruit is used as an adjunct to a metallic preparation which is given in diabetes and other urinary diseases In the Trichinopoly Manual it is said a juice is extracted from the trunk which is used by the natives in cases of diabetes In the Baroda Durbar report of the drugs shown at the Colonial and Indian Exhibition 'the SAP' is said to be used locally applied to mumps and other inflammatory glandular enlargements' *Dr Dymock* also alludes to this application and adds that it is employed in gonorrhoea in doses of four *tolas* The *Settlement Report* of the Chanda district adds that it is used as an application to wounds

The bark is given to cattle when suffering from rinderpest It is ground with onions cummin and cocoa nut spathes and mixed with vinegar (*Coimbatore Dist Man*)

F 188

GUM
180

DYE
181

MEDICINE
Leaves

182

Bark

183

Fruit

184

Root.

185

Galls

186

Milky Juice

187

Sap.
188

The Gular or Umbar Fig (Murray & Watt)

FICUS heterophylla

SPECIAL OPINIONS § — 'Used in cases of spongy gums to harden them (Surgeon Major Ratton M D Salem). An infusion of the bark is much employed by the Tamil speaking people for menorrhagia (Surgeon W F Thomas Madras Army Mangalore). The sap of the root is used in diabetes (Native Surgeon T Ruthnam Moodelliar Chingleput Madras Presidency). The tree grows very commonly in Mysore and the bark is frequently given as an astringent' (Surgeon Major John North Bangalore)

Food — The **FRUIT** (which ripens from April to July) is very inferior but is occasionally says Stewart eaten raw and in curries by the poor Campbell remarks that the Santals cook the unripe figs in their curries Gamble however writes that the ripe fruit is eaten and is good either raw or stewed Atkinson adds that the fruit affords a valuable food resource in seasons of scarcity and Dr Dymock that it was eaten in the famine of 1877 Brandis confirms this observation enlarging that the unripe fruit is pounded mixed with flour and made into cakes

Fodder — The **FRUIT** is greedily eaten by cattle The **LEAVES** are collected as cattle and elephant fodder

Structure of the Wood — Grey soft mottled on a longitudinal section Weight 25 to 30 lb (Gamble) Pale brown coarsely fibrous light and perishable (Kurs) It is not durable though it lasts well under water and is consequently used for well frames (Stewart) In Trichinopoly it is said to be used for building purposes but it is described as brittle and coarse grained It is spoken of as one of the timbers of the Puri district Orissa In Kolaba (Bombay) the wood is reported to be used for rice mortars In Khandesh the wood is used for shoring wells and in Kanara it is described as often employed for doors and well frames In Ahmad nagar it is said to be employed for planks and shutters

Sacred. — In the *Baroda Gasetteer* it is stated that there is a common belief that near every *umbar* tree there runs a hidden stream The tree is regarded as sacred

[636 659 661 King *Ficus* pp 75 77 Pl 94

Ficus heterophylla, Linn f *Fl Br Ind* V 518 Wright Ic 1

Syn — *FICUS TRUNCATA DENTICULATA RUFESCENS* Vahl *F TRUNCATA REPENS RUFESCENS* Ham ; *F AQUATICA* Kanig ; *F SCABRELLA* and *HETEROPHYLLA* Roxb *F REPENS* Willd Roxb *F RUBIFOLIA* Griff

Vern — *Gaori shiora baldahula balalatd ghoti suara bhui damur* BENG *Ballam dumur* CHITTAGONG, *Pakhur* C P Buron TEL *Vall teragam* MALAY *Wal-ehetd* SING *Trayamand* SANS

References. — Roxb *Fl Ind* Ed C B C 637 638 Brandis *For Fl* 424 Kurs *For Fl Burm* II 455, 456 ; Dals & Gibs *Bomb Fl* 243 Elliot *Flora Andh* 32 Trimen *Cat Fl Pl Ceylon*, 84 U C Dutt *Mat Med Hind* 321 Settle *Rept, Seone* 10 ; *Gasetteer Mysore & Coorg* I 70 *Gasetteer N W P (Bundelkhand)* I 84

Habitat. — A creeping pubescent shrub common along the banks of larger rivers throughout the hotter parts of India and Burma from Chittagong and Ava down to Upper Tenasserim Distributed southward to Perak and Ceylon

The *Flora of British India* refers the polymorphous forms of this species to two varieties —

F scabrella Roxb characteristic of Chittagong — Roxburgh

F repens, Willd

Medicine. — The **JUICE** of the **ROOT** of this shrub is internally administered in colic pains and the juice of the **LEAVES** mixed with milk in dysentery The **BARK** of the root, which is very bitter pulverised and

MEDICINE.

FOOD
Fruit.
189

FODDER.
Fruit.
190
Leaves
191
TIMBER
192

SAORED
193

194

195
196
MEDICINE.
Juice
197
Root.
198
Leaves.
199
Root-bark
200

**FICUS
hispida.****A Useful Emetic.****FOOD
Fruit
201****202**

mixed with coriander seed is considered a good remedy in coughs and asthma and similar affections of the chest (*Rheede*)

Food—The fruit of *scabrella* is eaten by the natives of Chittagong in curries (*Roxb*)

[154 155 *Wight Ic t* 638 641
Ficus hispida, Linn, f, Fl Br Ind V 522 King *Ficus Plates*

Syn.—FICUS OPPOSITIFOLIA Willd Roxb Corom Pl t 124 F PRO-
MINEUS Wall F DEMONUM Koenig F MOLLIS Willd COVELLIA
DEMONUM Miq Dals & Gibs

Vern—Kagsha gobla totmila kat gularia konea-dumbar HIND ; Dumar
hako-dumar kak dumar BENG Bhudo; CHUTIA NAGPUR Kotang
sosokera KOL Sita pordoh SANTAL, Khoshadumar ASSAM Shakab
GARO Koreh KURKU Kharwa NEPAL Kharwa PAHARI Taksot
LEPCHA Poksha MICHU, Maiu lok MAGH Bhudo; MAL (S P) Katu
mer, bomar GOND Kagsha kagoha dhura gobla tomila KUMAON
Dadiri digar rumbal PB Katumbri C P Rambal dumbar
mi a dheda BOMB Kharawat MAR Dhe daumaro jangli angr
Guz Dhedume a PANCH MEHALS Pe-atliss (*Moodeen Sheriff*)
TAM Boda mamadi bomma medi brahma medi bummarri bamari
korasana TEL Adavi atti KAN Pe-yatti paraka MALAY Kadut
kadot BURM Kota dimbula SING Kakadumbar ummialto-dumbara
SANS Tine barri ARAB Anyir dashte PERS

References—Roxb Fl Ind Hd C B C 647 Brandis For Fl 423
Kurs For Fl Burn II 460 Beddome, For Man 224 Gamble Man
Tomb 340 Trees Shrubs &c Darjeeling 76 Dals & Gibs Bomb
Fl 443 244 Elliot Flora Andh pp 28 30, 31 77 98 Trimen Syst
Cat Pl Ceylon 84 Iharm Ind 217 Moodeen Sheriff Supp Pharm
Ind 143 U C Dutt Mat Med Hind 301 Dymock Mat Med W
Ind 2nd Ed 745 Atkins in Him Dist 737 Drury U Pl 216
Lisboa U Pl Bomb 131 Balfour Cyclop I 1101 Home Dept Cor
regarding Pharm Ind p 240 Indian Forester X 325 XIV 391

Habitat—A moderate sized tree or shrub common throughout the
outer Himalaya from the Chenab eastward ascending to 3500 feet
Bengal Central and South India Burma and the Andaman Islands
Distributed to Malacca Ceylon China and Australia

Fibre—Dr Dymock informs the writer that in Bombay (especially
near the coast) a fibre is prepared from the BARK which is used for tying
bundles

Medicine—The FRUIT SEEDS and BARK are possessed of valuable emetic
properties followed by more or less purging This property was first
brought to notice by Dr Moodeen Sheriff The acrid MILK obtainable
from this species is used medicinally in Kangra The bark in doses of
from 15 to 30 grains three or four times daily is stated to act effectually
as an antiperiodic and in half these quantities as a good tonic (*Pharm
Ind*) In Bombay and the Concan the powdered fruit heated with water
to form a poultice is applied to buboes It is also given to milch cattle
to dry up their milk (*Dr Dymock*)

SPECIAL OPINIONS—§ According to Sanskrit writers the figs of this
plant promote the secretion of milk They are also supposed to preserve
the foetus in the womb (*U C Dutt, Civil Medical Officer Serampore*)

I have been using the fruit seeds and bark of *Ficus hispida* occa-
sionally in my practice ever since I first found them in 1867 to possess the
emetic property They are good emetics and act efficiently if assisted
with warm water and tickling of the throat The seeds of the ripe fruit
should be dried and preserved from moisture in stoppered bottles reduced
to a powder when required and administered in one-drachm doses The
bark is a stronger emetic but its action is sometimes attended with more
or less purging Its dose is from forty grains to a drachm The dose of

F 207**FIBRE
Bark
203****MEDICINE
Fruit
204
Seeds
205
Bark
206
Milk
207**

The Citron-leaved Ficus (Murray & Watt)

FICUS
infectoria.

the ripe and fresh fruit is from four to six ' (*Honorary Surgeon Moodeen Sheriff Khan Bahadur Trichipanc Madras*)

Food and Fodder—The FRUIT which is small and covered with short white hairs is according to Gamble edible The LEAVES are lopped for cattle fodder and are good for elephants

Structure of the Wood—Soft dirty grey no heartwood no annual rings Weight 25 to 35 lb Put to no economic use

Domestic Uses—According to Balfour this is one of the most destructive of figs to buildings

FOOD
Fruit
208
FODDER
Leaves.
200
TIMBER
210
DOMESTIC.
211

Ficus indica, Linn *Sp Pl Fl Br Ind V* 506 *King Ficus pp* [39 40 *Pll* 45 83b

Syn—FICUS SUNDAICA & RUBESCENS *Bl* UROSTIGMA RUBESCENS
SUNDAICUM PSEUDO-RUBRUM *Miq* F LONGIFOLIA *Ham* F INDICA
Linn Kurs For Fl Barm II 442

Habitat.—A large spreading tree of Burma and the Andaman Islands It seems probable that some of the economic information recorded under **F bengalensis** may probably refer to this species Until recently in popular works **F indica** has been treated as a synonym for **F bengalensis**

[1 665 *King Ficus* 60 1 75 to 79

F infectoria, Roxb (*non Willd*) *Fl Br Ind V* 515 *Wight Ic*

Syn—F TJELA Wall F VENOSA Wall F LACOR *Ham* F LUCESCENS *Blume* UROSTIGMA INFECTORIA *Miq*

The *Flora* remarks that several geographical forms occur of which three are Indian —

F infectoria proper

F Lambertiana, *Miq*

Syn—UROSTIGMA LAMBERTIANUM *Dals & Gibs*

A tree of Western and Central India

F Wightiana Wall *Bodd For Man* 222

A tree of the south edge of the Gangetic plain and Western Ghats

Vern—Pilkhan kikhmal ramanjir pakhar pakri keol kaim khabar pakur HIND P kar paku BENG Baswesa KOL Prab GARO Safed kabra N PAL Kangji LEPCHA Pepere KURKU; Serilli GOND Pakhar MELGAT Pakur N W P War pakhi batbar jangli pipli pal kh pakhar pilkin trimbal PB, Killah KONKAN Pipli bassari pakri kaim BOMB Pepar gundhambara dhedum bara MAR Pepri GUZ Jooi kalt alun pepre kurku TAM; Yewi yuri bassari TEL Kari basri bassari KAN; Tsjakela MALAY Nyaungchin nyounghin BURM kalaha kiripella SING; Plaksha parkati SANS

References—Roxb *Fl Ind Fd CBC* 643 *Brandis For Fl* 414 *Ku s For Fl Burm II* 446 *Beddome For Man* 222 *Gamble Man Timb* 334 *Dals & Gibs Bomb Fl* 241 *Stewart Pb Pl* 214 *Sir William Jones V* 159 *U C Dutt Mat Med Hind* 235 312 313, *Atkinson Him Dist* 317 *Lisboa U Pl Bomb* 129 235 *Lotard Dyes* 33 *Watson Report on Gums* 61; *Lew Reports*, 1879 34 *For Ad Report Ch Nagpu* 1885 33 *Journ Agr-Hort Soc XIV* (*Stewart on Hasara*) p 29 *VII* 1885 *New Series* 263 276 *Indian Forester Vol I* 274 *VI* 218 *VIII* 82 *X* 33 325 *XIII* 121 *Gazetteers N W P* (*Bundelkhand*) 1 84 (*Agra*) IV, *Lxson Hosharpur II* *Jalandhar* 5 *Ludhiana* 10 *Karnal* 16; *Settle Repts Shahjehanpur IX*

Habitat.—A large tree (*Gamble*) a deciduous low tree (*Fl Br Ind*), found in the Sulman and Salt Ranges the outer Himálaya, the plains and hills of India Bengal Assam Burma, Central India and specially the Western Coast Forest Commonly planted rarely met with wild

Fibre.—The BARK yields a fibre which is said to be good for ropes (*Gamble*)

FIBRE
Bark
217

FICUS
oppositifolia.**A Burmese Caoutchouc-yielding Plant****MEDICINE**
Bark
218

Medicine—The BARK of this along with the barks of other four species of *Ficus* and of *Melia Azadarachta*, pass by the name of *Panchaval kala* (or the five barks) they are used in combination. A decoction is much employed as a gargle in salivation as a wash for ulcers and as an injection in leucorrhœa.

FOOD
Young shoots.
210

Food and Fodder—The YOUNG SHOOTS are said to be eaten in curries by the natives. The LEAVES make good elephant and cattle fodder (*Brandis*).

FODDER
Leaves
220

Structure of the Wood—Grey moderately hard. Weight about 35lb not durable. It is used in Assam and Cachar to make charcoal but according to Roxburgh it is useless even for firewood.

TIMBER
221

Domestic Uses—A good avenue tree and planted for ornamental purposes.

DOMESTIC
222

Ficus laccifera, Roxb. see *F. altissima*

223

F mysorensis, Hevne Fl Br Ind V 500 King Ficus 19, t [14 15 81]

Syn.—*F. INDICA* Linn. in part *F. COTONIFOLIA* Vahl *F. CITRIFOLIA* Willd. *F. GONIA* Ham. *UROSTIGMA MYSORENSE* Miq. *U. DASYCARPUM* Miq. *F. SUBREPANDA* Wall. *F. TOMENTOSA* Hort. Madr. *Rheede Hort. Mal. III t 57*

References—*Beddome For Man 222 Kurr. For Fl. Burm. II 440 Dals & Gils Bomb. Fl. 24, Gamble Cat. Trees Shrubs, &c. Darjeeling 73 Trimen Cat. Ceyl. Pl. 84 Lisboa U. Pl. Bombay p. 129 Bomb. Gas. Kanara XVI Pl. I 443*

Vern.—Goni KAN. *Sunkong kung* LEPCHA. *Bunuga* SING.

Habitat—A large umbrageous tree met with in the forests at the base of the Himálaya from Sikkim eastward. Khasia Hills. Burma. the Deccan Peninsula. and Ceylon.

TIMBER
224

Structure of the Wood—Enumerated among the timber trees of Bombay.

225

F nemoralis, Wall. Fl Br Ind V 534

Syn.—*F. GEMELLA* and *F. BINATA* Wall. *F. DENSE* *F. TRILEPIS* and *F. FIELDINGII* Miq.

References—*Brandis For Fl. 424 Gamble Man. Timb. 338*

Habitat—A moderate sized tree of the outer Himálaya from the Hazára to Bhutan ascending to 7 000 feet. Khasia Hills. Assam.

Fodder—The LEAVES are lopped for cattle fodder (*Gamble*).

FODDER
Leaves
226

Structure of the Wood—White moderately hard close-grained.

TIMBER
227

Weight 38lb per cubic foot.

F nitida, Thunb. See *F. retusa*, Linn.

228

F obtusifolia, Roxb. Fl Br Ind V 507 Wight Ic t 662 [King Fic 42 t 49 83^r

Syn.—*F. LONGIFOLIA* Ham. *UROSTIGMA OBTUSIFOLIUM* Miq.

Vern.—*Krapchi* MICH. *Date*, MAGH. *Nyaunggyat* SHAN. *Nyoung kyap* BURM.

References—*Roxb. Fl. Ind. Ed. C B C 641 Kurr. For Fl. Burm. II 443*

Habitat.—A small leaved large epiphytic tree of the tropical forests at the base of the Eastern Himalaya from Sikkim to Manipur. Assam. Chittagong. Burma. and Perak.

GUM
229

Gum—Yields a rather good quality of caoutchouc (*Gamble Man. Timbers*). Gives an India rubber of inferior quality (*Gamble, List of Trees and Shrubs &c. of Darjeeling*).

F oppositifolia, Willd. See *F. hispida*, Linn. fil.

F 229

The Peepul Tree (Murray & Wat)	FICUS religiosa.
Ficus parasitica, Kæn See F gibbosa, Blume	
<p>F palmata, Forsk <i>Fl Br Ind V 530, Wight Ic t 649 King</i> [Fic, 146 t 185] Syn — F CARICOIDES Roxb F VIRGATA Roxb Wright, Brandis F PSEUDO SYCAMORUS Dcne</p>	230
<p>Vern — Gular khabara anjuri beru bedu HIND Phagwara kdk kot, phedé insar phag kirmi phagoru fagu phog, khabare, phagra thapur jamir dhuru dhudi daholia PB Phagwara (HAZARA) PUSHTU Angir insar AFG Kembri (MARWARA) RAJ Dhoura C P Pepri GUZ Fagwara thapur (PLAINS OF UPPER INDIA)</p>	
<p>References. — Roxb <i>Fl Ind Ed C B C, 636</i> Brandis <i>For Fl 419</i> Gamble <i>Man Timb, 338</i> Stewart <i>Pb Pl 212</i> Boiss <i>Fl Orient IV 1155</i> Baden Powell <i>Pb Pr 377</i> Atkinson <i>Him Dist 317</i> Econ Prod of N W P V 84 Balfour <i>Cyclop I 1102</i> Gasetteers Simla 9 Hosharpur 11 Amritsar, 4 Agra IV lxvii Indian Forester Vol VI 218 VIII 82 XII App XXI Settlt Report Hasara 12, Stewart <i>Journal of Tour in Hasara (Journ Agri Hort Soc Vol XIV 7</i></p>	
<p>Habitat. — This may be called the Indian representative of Ficus Carica. It is a bush or moderate sized tree and is found in the Sulman and Salt Ranges and in the outer Himalaya of the Panjáb eastward to Nepal and Oudh ascending to 6 000 feet. It also occurs on Mount Abu.</p>	
<p>Medicine. — The FRUITS contain chiefly sugar and mucilage and accordingly act as a demulcent and laxative. They are principally used as diet in cases of constipation and in diseases of the lungs and bladder. They are also used like the fruits of Carica as poultices (<i>Baden Powell</i>).</p>	MEDICINE Fruits. 231
<p>Food and Fodder — The FRUIT is eaten by the natives in the Panjáb hills. Stewart says that at 5 000 feet he has found it excellent though generally poor fruit. It is largely eaten by the natives and is even exported to the plains (<i>Atkinson</i>). It ripens from June to October. The LEAVES are given to cattle as fodder.</p>	FOOD Fruit 232 FODDER Leaves 233
<p>Structure of the Wood — White close- and even grained moderately hard. Weight 30lb per cubic foot. According to the Revenue Settlement Report of Belaspore this is one of the timbers most commonly used in that district for building.</p>	TIMBER 234
<p>F pomifera, Wall <i>Fl Br Ind V 535 King</i> <i>Fic 171, Pl, 215</i> Syn — F HAMILTONIA Wall F OLIGODON Miq F REGIA, Miq Kurs Vern — This seems to be the <i>Neuverra</i> of Nepal.</p>	235
<p>It seems probable that the bulk of the economic information published by popular writers under F regia, Miq should be relegated to this species but according to King some of the botanical writers who deal with F regia refer to F pomifera, others to F Roxburghii.</p>	
<p>[<i>King</i> <i>Fic 55 t 67A 84</i> <i>Bedd</i> <i>Fl Syl t 314</i> F religiosa, Linn <i>Fl Br Ind V 513 Wight Ic, t 1967,</i> The PEEPUL TREE</p>	236
<p>Syn — F AFFINIOR Griff UROSTIGMA RELIGIOSUM Gaspar Dals & Gibs U AFFINE Miq Vern — Pipal HIND; Ashathwa aswat asud asvattha, BENG; Hesar pipar KOL Hesak SANTAL Jari URIYA, Bor-bur CACHAR Pipli NEPAL Ali GOND Pipri KURKU Pipal dhur PB Pypal, PUSHTU Pipur SIND Jari pimpal piplo (SURAT) BOMB Pimpala MAR Pipul GUZ; Arasa aswartham TAM Rás raiga, ragi rési or kulla rési TEL Rangi basri arali arle haspath ragi asvattha, KAN Nyaungbaudi nyaungbaude nyaungbaudi nyaungbaudi BURM; Bo (Arasa TAM) SING Aswathihamu asvattha SANS</p>	
<p>References — Roxb <i>Fl Ind Ed C B C 642</i> Brandis <i>For Fl, 415</i> Kurs <i>For Fl Burm II 448</i> Gamble <i>Man Timb 334</i> Dals &</p>	F 236

FICUS religiosa.**The Peepul Tree.**

Gibs Bomb Fl 241 Stewart Pb Pl 213 Campbell Report Econ Prod Chutia Nagpur No 7548 Cleghorn 199 Mason, Burma and its People, 424 776 Trimen Cat Pl Ceylon 83 Sir W Jones V 150 Flora Andh Elliot 17 162 163 Ainslie Mat Ind II 25 O'Shaughnessy Beng Dispens 577 U C Dutt Mat Med Hind 292 Dymock Mat Med W Ind 2nd ed 743 S Arjun Bomb Drugs 198 Murray Pl and Drugs Sind 31 Med Top Oude 4 Baden Powell Pb Pr 377, Atkinson Him Dist 317 737 Drury U Pl 217 Lisboa U Pl Bomb 130 204 279 283 290 291; McCann Dyes and Tans Beng 50 136 144 159 165; Liotard Dyes, 33 Liotard Paper making Mat 31 Report on Indian Dyes by Wardle 24 Watson Report by 34 43 44 61 65 Balfour Cyclop I 1101, Kew Off Guide to the Mus of Ec Bot 122 Kew Off Guide to Bot Gardens and Arboretum 29 42, Journ Agri Hort Soc 1885 VII (New Series) 263-276 Indian Forester I 273; III 205 236, V 212 VI, 218 240 VII 277 X 63 325 XII App XXI XXVIII XIII 58 69 121 XIV 391 Bomb Gas II 39 355 III 199, IV 24 V 28 285, VI 13 183 VII 37 39 40 43, X 39 XII 26 XIII 26 XV Pt I 69 XVIII Pt I 51 XX 13 XXIII 64 Panjab Gasetteers Sialkot 11 Ludhiana 10 Fuldand 5 Meerut 33 Delhi 18 Hoshiarpur 10 Karnal 16 Ramalpindi 15 Jhang 17 Montgomery 18 N W P Gasetteers Agra IV p lxxviii Mozuffarghu 22 Oudh Gas Vol II 345 Mysore and Coorg Vol I 47 70 111 25 Manual Trichinopoly Dist 78 Man Chindwara Dist 110

Habitat —A large glabrous usually epiphytic tree found wild in the sub-Himalayan forests in Bengal and Central India. Extensively cultivated in most provinces of India though less frequently so in Burma.

Gum —The bark yields a tenacious milky juice which hardens into a substance resembling Caoutchouc.

Its stem gives out a resinous gum which is used as sealing wax and is also employed by artificers to fill up the cavities of hollow ornaments (*Gas Bomb VII 37*). This same curious fact is alluded to in the Ahmedabad Gazetteer (IV 24). It is there stated that The *peplo* (*Ficus religiosa*) and the *bordi* (*Zizyphus Jujuba*) yield a wax much used by goldsmiths for staining ivory red. It may here be pointed out however that these trees are the chief source of lac and that the so called gum mentioned above may be only the waxy excretion caused by the lac insect and not a gum at all. The Rev A Campbell remarks that the milky sap is known among the Santals as *loré*. Lac is abundantly produced on this tree indeed according to many writers this is its chief use. A bird lime is prepared from the milky juice which is in the Deccan called *shelim*.

SPECIAL OPINIONS —§ Juice used as a bird-lime. One-fourth seer pipal juice 2 chittacks linseed oil (castor oil will not do); simmer over fire for five minutes let cool" (*W Forsyth Civil Medical Officer Dinajpore U C Mukerji M B C M, Civil Medical Officer, Dinajpore*).

Dye and Tan —The BARK is said to be sometimes used in tanning. Drury mentions that the LEAVES are employed by the Arabs for this purpose. Wardle however says it contains little or no tannin but yields to boiling water a reddish pale-brown colouring substance which by the employment of various processes gives to tasar mulberry silk and woollen fabrics faint reddish fawn colours. The amount of colouring matter in the bark is small but it might prove a convenient dye where faint shades are required or for modifying the colours produced by other dye-stuffs. McCann wrote that the bark of this tree is also mentioned as being used along with other barks when preparing a permanent black in Bengal. Liotard says the roots on being boiled in water, produce with alum on cotton cloth a pale pink colour.

F 239

GUM
237

DYE and TAN
Bark
238
Leaves.
239

The Peepul Tree.	(Murray & Watt)	FICUS religiosa.
<p>Fibre.—A fibre is extracted from the BARK In Burma this was formerly made into the paper used in the construction of the peculiar green umbrellas of that province but the manufacture is rapidly dying out, and the umbrellas in use by Burmans are now mainly imported from China</p>		<p>FIBRE Bark 240</p>
<p>According to Cross Bevan and King the chemical composition of this fibre is—Moisture 100 Ash 79 Hydrolysis by (a) process (i.e. boiling in alkali for five minutes) loss 22.6 by (b) process boiling for one hour) loss 46.8, Cellulose 41.2 Chemically therefore the fibre may be pronounced worthless The percentage composition of cellulose is very low, and the loss by weight due to alkali purification is ruinously high</p>		
<p>Medicine—The BARK is astringent and is used in gonorrhœa It has also maturative properties An infusion is given internally in scabies The ROOT BARK is one of the five barks used by the Sanskrit physicians The FRUIT is laxative and helps digestion Dried and powdered if taken in water for 14 days it is said to remove asthma and make women fruitful (<i>Bartolomeo</i>) The SEEDS are said to be cooling and alterative The LEAVES and YOUNG SHOOTS are used as a purgative and have the reputation of being useful in skin diseases (<i>Ainslie Wight</i>) A paste of the powdered bark is employed as an absorbent in inflammatory swellings (<i>Dr Emerson</i>)</p>		<p>MEDICINE Bark 241 Root bark 242 Fruit 243 Seeds. 244 Leaves. 245 Shoots 246</p>
<p>SPECIAL OPINIONS—§ Water in which the freshly burnt bark has been steeped is said to cure cases of obstinate hiccup (<i>Civil Surgeon F H Thornton BA MB Monghyr</i>) Ashes of the growing shoots when well sifted are sprinkled on chronic unhealthy ulcers to bring them into a healthy condition (<i>Surgeon Major Bankabihari Gupta MB Pooree</i>) In cracked foot the JUICE is employed which is very sticky (<i>Assistant Surgeon T N Ghose Meerut</i>) The powder of the dried bark is used in fistula in ano I have seen a hakim use it with benefit in the following way he introduced a metallic tube something like a blow pipe into the fistula and putting a small quantity of the powder into it blew the same into the fistula (<i>Assistant Surgeon Nobin Chunder Dutt Durbhanga</i>)</p>		<p>Juice 247</p>
<p>Food and Fodder—The small smooth elliptical LEAVES and BRANCHES are good elephant and buffalo fodder According to Campbell the leaves are extensively lopped as cattle fodder The young leaf buds are eaten in Central India in famine times (<i>Gamble</i>) According to some writers the small FIGS of this tree are eaten but possibly during famine times only Mr Campbell says they ripen in the cold weather and are regularly eaten by the Santals The gori silk worms are fed in Assam on the leaves of this tree</p>		<p>FOOD AND FODDER Leaves 248 Branches 249 Fruit. 250</p>
<p>SPECIAL OPINIONS—§ The leaves are used as a vegetable by the Gonds (<i>Narain Misser Kathe Bazar Dispensary Hoshangabad Central Provinces</i>)</p>		
<p>Structure of the Wood—Greyish white moderately hard Weight 30 to 45 lb (<i>Gamble</i>) Uniformly yellowish white very light coarsely fibrous perishable takes an inferior polish (<i>Kurz</i>)</p>		<p>TIMBER 251</p>
<p>In the <i>Indian Forester</i> the following is given as the analysis of the ash —Soluble potassium and sodium compounds 0.15 Phosphate of iron, calcium &c 2.25 Calcium carbonate 1.96 Magnesium carbonate 1.07 Silica with sand and other impurities 0.05 total ash 5.48 (<i>Vol X, 63</i>) It is used for fuel for packing cases and in Cachar for charcoal</p>		
<p>Domestic and Sacred Uses—Largely planted as an avenue and road side tree especially near temples It is held sacred by the Hindus being viewed as the female to the Banyan <i>Lisboa</i>, however says that according to the <i>Valkhilya</i> the marriage of the peepul with the tulas (<i>Ocymum</i></p>		<p>DOMESTIC AND SACRED 252</p>

**FICUS
retusa.****SACRED**

sanctum) is ordered. He further remarks that it is the transformation of the gods *Guru* and is termed *Ashwath*. It is specially worshipped on every Saturday of the month *Shrāvan* and on every *Somvati* i.e., on every Monday on which a new moon falls. The Hindu who plants a peepul tree does so expecting that just as he thereby affords shade to his fellow creatures in this world so after death he will not be scorched by excessive heat in his journey to the kingdom of Yama (*Oudh Gas III*, 345). There are five sacred trees among the Hindus *vis peepul gulār bargad pākar* and *mango* but of these the first is by far the most revered. A good Hindu who on a journey sees a peepul tree will take off his shoes and walk five times round the tree from right to left (*pardachna*). While doing so he repeats the verse which may be translated: The roots are Brahma the bark Vishnu the branches the Mahadeos. In the bark lives the Ganges the leaves are the minor deities. Hail to thee king of trees' (*Elliott Chronicles of Ornao*).

The peepul is believed to be inhabited by the sacred triad Brahma Vishnu and Shiv. It is used at the thread investiture and at the laying of the foundation of a building. Vows are made to it and it is worshipped male offspring is entreated for under its shade pious women moving round its trunk 108 times. So sacred is it that none will destroy it even when it grows on the crevices of walls and buildings pulling down the strongest masonry. Of its wood the spoons are made with which to pour clarified butter on the sacred fire" (*Bomb Gas V 37*).

[Fic 50 t 61 62 84^r

253

Ficus retusa, Linn Fl Br Ind V 511 Wight Ic t 642 King

Syn—F DILATATA *Miq* F NITIDA *Thumb* Wight *Ic* F RUBRA *Roth* F LITTORALIS *Blume* F MICROCARPA *Linn* F BENJAMINA *Willd Roxb Fl Ind* UROSTIGMA RETUSUM NITIDUM MICRO CARPUM and OVOIDEUM *Miq*

Vern—*Kamrup* sir BENG Butisa KOL Sunumjon SANTAL Fīlī CHUTIA NAGPUR Jamu NEPAL Sitnyok LEPCHA Fīlī MAL (S P) Nandruk MAR Yerrajuvu nandirēka TEL Pilala pinval KAN Nyaungok nyounghahveh BURM

References—*Roxb Fl Ind Ed C B C 643 Brandis For Fl 417 Kurs For Fl Burm II 444, Beddome For Man 223 Gamble Man Fimb 336 List Trees and Shrubs &c of Darjeeling 75 Dals & Gibs Bomb Fl 241 242, Trimen Cat Ceyl Pl 84 Filist Fl Andh 27 68 Dymock Mat Med W Ind 2nd Ed 745 Lisboa U Pl Bomb 130, Balfour Cyclop I 1101 For Ad Report Ch Nagpore 1885 33 Bomb Gas XIII 26 XV Pt I 69 XVI 16 Indian Forester III 205 VIII 332 IX 516*

Habitat—A large evergreen tree having a few aerial roots met with at the base of the Eastern Himalaya from Kumaon to Bengal Assam South India the Deccan Peninsula Burma and the Andaman Islands Distributed to the Malay Islands China and New Caledonia

The *Flora* describes two varieties of this species —

α *F retusa* *Linn*—The *Nandruk* of the Deccan Peninsula.

β *F nitida, Thumb*—The tree of the trans Gangetic regions

Medicine.—The bark of the ROOT the root itself and the LEAVES boiled in oil form good applications for wounds and bruises (*Rheede*). In rheumatic headaches the leaves and bark pounded are applied as a poultice. In flatulent colic the leaf juice is used mixed with that of *tulsi* and *ghī* (equal parts) applied externally and accompanied by fomentation with a hot brick (*Dymock Rheede*). The juice of the bark in doses of one tola in milk has a reputation in liver disease.

Structure of the Wood—Light reddish-grey, close-grained moderately hard beautifully mottled. Weight 40lb per cubic foot. It is used

F 259

254
255
MEDICINE.
Root-bark

256
Root

257
Leaves

258
TIMBER

259

The Peepul Tree

(Murray & Watt)

FICUS
Rumphii

for fuel but as it is very prettily grained it might be found valuable for tables, door panels and other purposes. A valuable avenue tree as it affords dense shade

[King Fic 168, t 211

Ficus Roxburghii, Wall, Fl Br Ind V 534, Wight Ic t 673

260

Syn.—F MACROPHYLLA Roxb, F SELEROPTERA Griff F REGIA Miq
CERELLIA MACROPHYLLA Miq

Vern.—Trimmal timal timala HIND Demur doomoor BENG; Sapas
MAGH Kotang KOL Kasrekan NEPAL Kundoung LEPCHA
Urbul urmul barbaru tust trimbal trimal timal daduri tremal
tirm; tiamb timal burh PB Ber (fruit = hurmal) (HAZARA) PUSH
TU Sin tha hpan BURM

References.—Roxb Fl Ind Ed C B C 645 Brandis For Fl 422 i
Kurs For Fl Burm, II 460 Gamble Man Timb 346 Stewart Pb
Pl 214 Atkinson Him Dist 317 Tropical Agricult 1889 566 For
Ad Rep Ch Nagpore 1885 33 Gazetteers Simla, 11 Hasara 13
Hoshwarpur 11

Habitat.—A moderate sized tree of the outer Himálaya from the Indus eastward to Bhutan ascending to 6 000 feet Sylhet Khasia hills Chitta gong and Burma

Fibre.—In the Sutlej valley a coarse rope is made from the bark

Food and Fodder.—The FRUIT is eaten in curries. It is described as handsome of a russet red colour and of the shape and size of a Dutch turnip. They are carried in enormous bunches on the stem especially near its base and in smaller bunches on the main branches. A specimen which fruited in the Botanic Gardens Calcutta produced about 1 cwt of figs. These are said to be unpalatable insipid and sloppy (Gardener's Chronicle). Stewart however remarks that the fruit is sweet and of a pleasant flavour. According to the Kangra and Simla Gazetteers it is regularly brought to market. The LEAVES are used as fodder

Structure of the Wood.—Reddish grey moderately hard Weight 34lb

[Ficus p 54 t 67 B 84 Brandis t 48

F Rumphii, Bl Fl Br Ind, V 512 Wight Ic 640 King

Syn.—FICUS CORDIFOLIA Roxb (non Bl) UROSTIGMA RUMPHII Miq
U CORDIFOLIUM Miq FICUS Sp Griffith Icon Pl As, t 549
Itin Notes III n 145

Vern.—Kabar gayna pipul gayin pipal gayaira pakar khabar HIND
Gaiazwat BENG Suman-pipar KOL Sunamjor SANTAL; Pakri
ASSAM; Sat bur CACHAR Pakar NEPAL Prab GARO; Kabas
pipal KUMAON Puldkh rumbal badha palák pilkhan PB; Parás
pipal RAJ Paur piyar asht (ashta) MAR Kabas pipal ganjar
suman pipar LOHARDUGGA Nyaung byu BURM

References.—Roxb Fl Ind Ed C B C, 642 Brandis For Fl 416;
Kurs For Fl Burm II 448; Gamble Man Timb 335; Stewart Pb
Pl 212 Mason, Burma and its People 424 776 Rev A Campbell,
Rep Econ Prod Chutia Nagpore No 8497 Dymock Mat Med W
Ind 2nd Ed 744 Atkinson Him Dist 317 Lisboa U Pl Bomb,
130 279, 284 291 Indian Forester I 86 IX 562, X 325 XII
App XXI Smith Dic 1099 For Adm Rep Chutia Nagpore
1885 33 Gazetteers Thana XIII 26 Kanara XV Pt 1 443
Ahmadnagar XVII 26

Habitat.—A large deciduous tree of the outer Himálaya closely resembling F religiosa, occurs on the dry lower slopes of the mountains of the Panjáb and in Northern Western, and Central India, Assam Burma, and the Malay Peninsula ascending to 5 000 feet. It is generally epiphytic and accordingly very destructive to timber trees. It is said in the Bombay Gazetteer (Ahmadnagar) to frequent teak wood forests and the regions of heavy rain. In Thana it is remarked that it is an unshapely tree,

E 265

FIBRE.
261
FOOD
FRUIT.
262

Leaves.
263
TIMBER
264

265

**FILICIUM
decipiens****The Peepul Tree**

thus being less suited for avenue and road side planting than *F retusa*, which is spoken of as the best of the road side trees In Oudh it seems to be specially associated with the *Sal* (*Shorea robusta*) The fruits ripen in May to June

Gum—Roxburgh remarks that the milky juice flows abundantly from fresh wounds and is very tenacious

Resin—The lac insect is reared extensively on *F Rumphii* in Assam This tree is specially cultivated for that purpose and is remarkable on account of the insect not destroying it though crops are taken annually

Fibre—According to the Rev A Campbell the BARK yields a cordage fibre of good quality

Medicine—The Santals use the FRUIT as a drug Dymock writes of this species The JUICE is used in the Concan to kill worms and is given internally with turmeric pepper and *gha* in pills the size of a pea for the relief of asthma it causes vomiting The juice is also burned in a closed vessel with the flowers of *umdar* and 4 *gunjas* weight of the ashes mixed with honey is given for the same purpose

Food and Fodder—The FRUIT is eaten by the natives The LEAVES and BRANCHES are used for cattle fodder

Structure of the Wood—Very soft spongy Weight 27lb per cubic foot The wood is used in Cachar to make charcoal and is also employed in tea manufacture and as fuel

Domestic and Sacred—The leaves are used in *panch-pallavs*

[*Fic* 59 t 74 84²

Ficus Tsiela, *Roxb Fl Br Ind V 515 Wight Ic t 668 King*

Syn—*F AMPLISSIMA* Smith, *F INDICA* VAR Linn *F BENJAMINA* Wall *UROSTIGMA PSEUDO TJELA* and *PSEUDO BENJAMINA* and *TJELA* Miq

Vern—*Jari* HIND *Pimpri* BOMB *Juvvi* *ichchu* TAM *Juvvi* (*joovi*) TEL

References—*Roxb Fl Ind Ed CBC 642 Beddome For Man 314 Thwaites Fn Ceylon Pl 265 Dalz & Gibs Bomb Fl 241 Cleghorn 196 199 Elliot Fl Andh 75 Lisboa U Pl Bomb 130 Indian Forester III 205 XII App 21 Mans Coimbatore Dist 39 Cuddapah 263 Bombay Gazetteer Vol XVII 26*

Habitat—A large spreading tree without aerial roots met with in the Deccan Peninsula from the Concan southward Roxburgh regards it as next to *F religiosa* the largest species of Indian fig It is a handsome tree with smooth bark wholly glabrous, and is met with in cultivation along roads throughout India

Fibre—The BARK gives a good fibre

Structure of the Wood—No author seems to have specially described this but it is used as firewood

F virgata, *Roxb*, see *F palmata*, *Forsk*

Filberts, see *Corylus Columna*, *Vol II p 575 No 1988*

FILICIUM, Thw, Gen Pl I 325

Filicium decipiens, *Thwaites Fl Br Ind I, 539; BURSERACEÆ*

Vern—*Katu guveras* TAM *Pehimba* SING

Habitat—A tree with elegant fern like leaves found in the Western Ghâts up to 4,500 feet also in Ceylon

Structure of the Wood—Heartwood red moderately hard Pores small in groups or short radial lines Medullary rays fine numerous at unequal distances Weight 68lb per cubic foot

The wood is strong and valuable for building (*Gamble Man Timb*, 68)

F 280

GUM

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RESIN

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FIBRE

Bark

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MEDICINE

Fruit

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Juice

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FOOD

Fruit.

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Leaves

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FODDER

Branches

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TIMBER.

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AND SACRED**

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FIBRE

Bark

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TIMBER.

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TIMBER

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The Fishes of India. (J Murray)	FISH
Filix-mas , see <i>Nephrodium Filix mas</i> , Richard, FELICES	
FIMBRISTYLIS , Vahl; Gen Pl III 1048 CYPERACEÆ The species of sedges referred to this genus do not appear to be of much economic value F Kysoor in Dals & Gibs Bomb Fl p 288 (<i>Scirpus Kysoor</i> , Roxb Fl Ind Ed CBC 77) is said to be eaten in times of famine (<i>Lisboa U Pl Bomb 208</i>) It is the Kysur or Kesuri of Bengal This should not be confused with <i>kesuria</i> — <i>Eclipta alba</i> .	281
Fimbristylis junciformis , Kunth is the <i>Bindi mutha</i> of the Santals the roots of which according to the Rev A Campbell are given in dysentery	282
F monostachya , Hassk is known to the Santals as <i>Nanha bindi mutha</i>	283
Fir , see <i>Abies</i> and <i>Pinus</i> , CONIFERÆ	
(J Murray)	
FISH Day Fishes in Fauna of British India	284
For the purposes of a description such as the following the Fish of India may be divided into two great classes—THE MARINE and the FRESH WATER—both of which are not only very large but owing to their forming an extremely important source of the animal food of the Natives of this country are well worthy of careful attention The question of the best means of protecting and stimulating the large fishing industries of India has always attracted much attention and the natural history of the subject has been the object of careful and laborious research on the part of many learned zoologists Of all the provinces of India a Fisheries Act exists in Burma alone but the question of framing an Act to embrace all the provinces is at present under the consideration of Government	
References —Day <i>Fishes of India</i> Fresh water Fishes of India and Burma Rep on Sea Fish and Fisheries of India and Burma Rep on Fish and Fisheries of the Fresh waters of India Rep on Fisheries of a sam Indian Fish and Fishing in the Internat Fisheries Exhb Lit Vol II Pt II 441 Condensed Rep Vol VIII 345 Catal of Ind Sec Fish Exhibit Beavan Fresh water Fishes of India Thomas Rod in India Rep on Pisciculture in South Canara Tennent Nat Hist of Ceylon 323 Rep on the Fisheries of the Hensada Dist Burma Seaton Rep on Fisheries in British Burma Rev and Agric Dept Proceedings on Fisheries Bill 1 to 13 June 1888 1 to 10 Jan'y 1889, Robinson Fishes of Fancy in Fish Exhb Lit Vol III Pt I Walpole Official Rep on the Internat Fish Exhb in Lit of same Vol XIII 15 Simmonds Commercial Products of the Sea Balfour Cyclop I 1107 Forbes Watson Ind Survey, 346—366 392 400 404, Bidie Cat Raw Prod of Southern India, Paris Exhb 96 Ainslie Mat Ind I 227 395 Irvine Mat Med of Patna 69 100 Gossietters of Bengal Central Provinces Madras Bombay North West Provinces Panjab in many passages	
Distribution in India. —The whole of the seaboard of India and Burma computed at about 4 611 English miles is washed by waters more abundantly stocked with fish than are even those which yield the great fish harvests of the British Isles Fish abound also in the rivers tanks irrigation canals ditches and marshes of this country—in fact wherever water exists from the sea level to almost the highest elevations	DISTRIBUTION.
Food —The value of such well stocked fisheries naturally depends to a great extent on the degree to which the production is utilized as food	FOOD 285
F 285	

FISH**Fishing Classes and Fisheries.****SH EATING
CLASSES**

by the people of the country. In considering this question it is therefore necessary to observe first of all what proportion of the people of India and Burma can consume fish as food without infringing religious prejudices. In the Panjáb and North Western Provinces comparatively few of the inhabitants are thus prohibited: the large Muhammadan population eat fish except those without scales and fins (such as the eel), while the Hindus with the exception of certain Brahmans Thakurs Baniyas and Bhagats consume fish of all kinds. Similarly in Hyderabad Mysore and Coorg more than half the population are permitted by their religion to consume fish. In Oudh the majority can do so and in Sind nearly all except the Brahmans. Varying statements are made regarding Bombay in the District Gazetteers: from three fourths in Khandesh to 25 per cent in Bijapur but the former figure probably represents more nearly the actual average, only Brahmans high caste Sudras Márwár Vanís I engáyats Jains and a few others being prevented by their castes from eating fish. In Madras about a similar percentage in Bengal proper from 90 to 95 per cent in Assam and Chittagong almost the entire population are permitted to eat fish while in Burma the use of fish diet is universal notwithstanding that the Burmans as Buddhists profess the greatest horror at taking the lives of the lower animals. They console their consciences however with the idea that the sin lies entirely with the fishermen and in Burman temples are depicted vivid representations of the terrible tortures the latter will have to endure in a future existence.

Notwithstanding the enormous market for fish and the teeming waters in and around India the supply appears to be everywhere insufficient to meet the demand while the fishing classes are wretchedly poor. Dr Day in commenting on this fact writes: Investigating how the local markets were supplied with fish up to 1873 the replies from native officials gave the following results. In the Panjáb one in ten markets was sufficiently supplied in the North West Provinces one in three in Oudh one in four. In Bombay the amount was stated to be insufficient in all and similar reports came from Hyderabad Mysore and Coorg. In Madras near the sea the quantity was sufficient but inland it was only so in one out of ten. In a further passage he writes: The most casual observer cannot fail to perceive how numerous are the varieties and vast the number of the finny tribes in the seas of India but from some cause—whether due to legislative enactments and local obstructions or native apathy and impecuniosity—the harvest has, up to within the last few years been comparatively untouched: an enormous amount of food still remain uncaptured while famines are devastating the contiguous shores.

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CLASSES.
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Fishing Classes and Fisheries—The MARINE FISHING CLASSES of India present many features of great interest showing as they do survivals of manners and customs dating from very remote times. According to ancient Hindu legislation they belonged to the Sudra or servile caste. In most places they still maintain that they were of old divided into two distinct classes: (1) those who captured fish in the deep sea (2) those who pursued their avocation from the shore, fishing in back waters and creeks. Nowadays, however owing to the depressed condition of the fishing industry the deep sea fishermen (except where salt is cheap or a good local market exists) have taken to the less expensive occupation of plying their work inshore and earn part of their living by work of other sorts. In Sind the fishermen are Muhammadans and are termed Mohanís. They are probably partly immigrants from Arabia and partly Hindus converted to Islam. In Bombay they are chiefly Machhís Márátha Bhoís Káche Bhoís Menjage Bhoís Bagdí Bhoís, and Kolís but many other classes occasionally fish. In the Madras Presidency they have

Classification of Fisheries

(F Murray)

FISH.

customs of a patriarchal nature which are, however more strictly observed on the Coromandel than on the Western coast. The present organisation in those parts is probably the remains of a very ancient system as it is difficult on any other supposition to account for the immense hereditary power held by certain individuals. Not only have they hereditary and elective headmen of villages but also hereditary priestly chiefs who are the final referees in all family and caste disputes. Regarding these fishing tribes Dr Day writes. The condition of the sea fishermen in Sind about ten years ago when investigations were made showed that they were fairly well off miserably poor in Bombay except in the vicinity of large towns in a prosperous condition from South Cánara down the western coast of the Madras Presidency but on e round Cape Comorin they again appeared as a poverty stricken race of people and continued so up the Coromandel coast except when residing near large centres of population.

The FISHERMEN OF FRESH WATERS are as a rule members of fish eating castes who engage in fishing as an occasional and subsidiary occupation only a very few of the original fishing castes still restricting their means of livelihood to their hereditary industry. Under native rule in India this was not so fishing having then been in the hands of distinct castes but as British rule has given up taxes on the industry and of recent years fishing rents as well it is now no one's interest to prevent undue depletion of the fisheries and as a consequence fishing is no longer generally remunerative.

Classification of Fisheries—SALT WATER—Many and various methods of fishing are employed along the coasts of India and Burma of which it is impossible within the scope of the present article to give a complete account. The chief characteristics of the systems may however be briefly adverted to the information being chiefly compiled from Dr Day's elaborate account in his Fisheries Exhibition Report. *1st Tidal Fisheries*—May consist of simple tidal ponds into which fish are carried by the flood of the tide and are left impounded by the ebb. They are then removed by scoop laves cast or other nets or screens may be constructed of stonework bamboo rattan or reed to allow of the escape of the water while retaining the fish. Another common contrivance for tidal fisheries is the labyrinth composed of wicker work placed at right angles to the shore generally at the head of an estuary. *2nd Stake Nets*—Are probably an evolution of later date but now constitute one of the chief means of obtaining a supply of fish on certain parts of the Indian coast. The stakes which are generally made of the stems of certain palms and may have a height of as much as 100 feet are driven into the sand or mud at a distance of about 25 feet apart. To these long bag nets are affixed into which the fish are carried by the currents running along the shore. *3rd Moveable Nets*—Are of many forms—purse nets used in shallows cast nets drag nets and special nets for particular purposes varying in size shape and diameter of mesh according to the fish they are intended to capture. *4th Wicker Traps*—Are very extensively employed in all parts of the East. They may be cone or bell shaped with both ends open in which case they are employed in shallows the fisherman placing the larger end over the fish and extracting them from the smaller, or they may be built like a rat trap baited and simply placed in tideways. *5th Miscellaneous Methods*—Diving spearing shooting with arrows and fishing with hooks and lines with natural or artificial bait, are all employed in various parts of the country. *6th Deep sea Netting*—Is as already stated carried on to a very limited extent only not only because of the insufficiency of a remunerative market, but also because the necessary appliances boat net

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and methods
of capture.
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FISH.	Classification of Fisheries
FISHERIES	<p>&c are expensive and the fisher class is a miserably poor one For instance Dr Day informs us that in Sind a boat costs about £100 and a net suitable for deep sea fishing involves an outlay of from £40 to £50 The purchase of such an expensive plant therefore necessitates the borrowing of the money on which the fisherman has to pay an exorbitant interest leaving but a poor margin of profit as the reward of his labour</p>
FRESH WATER 289	<p>FRESH WATER—With the establishment of British rule the fishing on rivers which at one time was restricted either by the imposition of taxes or by leasing out to contractors the monopoly of fishing has become in most parts of the country free and unrestricted The natural result has been that every fish consumer is at liberty to capture his own fish and the old fresh water industry has necessarily declined But an evil outcome of this has been that every endeavour is now made to catch as many fish of all sorts and sizes as quickly and cheaply as possible and for this purpose all kinds of appliances are used Rivers are dragged with nets having infinitesimally small meshes or with coarse cloths or a similar apparatus is even placed across a stream from bank to bank and another dragged down stream to it thus clearing every living thing out of the tract netted At the same time the agricultural classes catch fish for themselves by means of wicker traps baskets and nets Neither breeding fish nor fry are respected everything caught is killed and eaten or destroyed and no close season anywhere exists hence as a natural result the supply of fish is everywhere diminishing This is especially so in the case of the finer migratory hill fishes such as the <i>mahasir</i> Owing to the immense number of wicker work and net weirs now to be found in most mountain streams at every few miles the water is literally strained with the inevitable consequence that the fish are rapidly decreasing in the lower reaches In some places more especially in the Doon hill tracts streams are also frequently diverted in part of their course by damming them up the large fish are extracted from the pools in the old bed of the river and the fry are left to die as the water dries up Not only are these and many other of the poaching practices so strongly condemned in England carried on day after day but poisoning the water is also frequently resorted to as a means of ready and wholesale destruction The principal plants employed for this purpose are —<i>Strychnos Nux vomica</i>, <i>Lasiosiphon speciosus</i>, <i>Balanitis Roxburghii</i> <i>Tephrosea suberosa</i>, <i>Euphorbia Tirucalli</i>, <i>Hydrocarpus Wightiana</i> <i>H venenata</i> Of recent years also a still more powerful agent of destruction has been found in dynamite to the use of which natives employed in mines and on tea coffee and cinchona estates have become habituated They find no difficulty in possessing themselves of their employers cartridges on off days and employ them freely with the result that the place dynamited is denuded of all fish life full grown fry and ova Besides these methods of directly killing fish there are many other artificial agencies which indirectly but to a very great degree affect fisheries in many districts Perhaps the most important of these is the large irrigation works now existing in many parts of the country formed by diverting a large amount of the water of a river down a canal Where these canals are not constructed for navigation as well as irrigation falls frequently exist down which the fish can pass, but cannot return The canal is thus converted into a vast fish trap wherein all the fish are destroyed when run dry to examine it for necessary repairs In the same way the small tributary irrigation canals act as traps from the main channel all the fish entering them being invariably killed The yearly inundations attendant on the rains and the annual drying up of many tanks must also be fertile sources of mortality Dr Day in summing up the consideration of this subject in his admirable report</p>
Contrivances. 290	
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Explosives 292	

Curing of Fish (J Murray)	FISH.
<p>writes Thus it has come to pass that among the animal productions of India fresh water fish meet with the least sympathy and the greatest per secution many forms having to struggle for bare existence in rivers which periodically diminish to small streams or even become a mere suc cession of pools or in tanks from which the water totally disappears They have their enemies in the egg stage in their youth and during their maturity but among these man is their greatest foe as any one who desires a fish diet captures these creatures whenever and wherever he gets the chance irrespective of season age and size In certain districts they simply appear to exist solely because man and vermin have been unable to destroy them</p> <p>Many suggestions have at different times been made to remedy this wholesale and indiscriminate destruction by such means as preventing poisoning regulating the size of net mesh guarding the mouths of irriga tion canals against the entrance of fish levying taxes on the use of fishing implements &c As above stated these are at present under the consi deration of Government with a view to the introduction of a Fisheries Bill</p> <p>Rent of Fisheries—The available amount of information regarding the proportion of fisheries either rented out by Government or owners is very meagre but from a few statistics derived from the Gazetteers of different districts it appears that the amount thus annually realised at the time of report must have been a large one Thus in Bengal alone 27 districts are mentioned as yielding a revenue to Government or proprietors the total of which was £6 417 In only a few were the value of the fisheries and the rent paid both given but a calculation based on these shows the percentage rent to have been 17 on the value of the property farmed The revenue derived from Sind Fresh water Fisheries in 1882 83 was R92 541 and from Burma in 1883 12 to 13 lakhs of rupees—a not un interesting evidence in favour of a Fisheries Act for the other provinces of India</p> <p>Salt and Dried Fish—It is apparent that in a tropical country such as India the prosperity of sea fisheries must to a very great extent depend on the facilities afforded for curing fish thoroughly and at a sufficiently small cost to meet the demand In olden times this was possible, as salt was allowed duty free in British territory for salting fish but this privilege was withdrawn because the excise officers found that it facilitated smug gling As a consequence the fishermen and fish curers have done their best to escape from the tax and in many localities employ salt earth which imparts a bitter and unpleasant flavour to the fish and is liable to engender disease while in other districts the fish are simply cleaned dipped in the sea and dried in the sun Fish thus prepared are very inferior often half putrid and are only used as food by the poorest classes while fish prepared by taxed salt are only bought by the rich and for exportation It is to be hoped however that means may be found to remedy this state of matters indeed during the last few years the system of bonded enclosures within which fish may be cured with free salt has been tried at Madras and with a fair amount of success In Burma a putrescent preparation of fish is largely eaten called <i>nga pi</i> It is prepared as follows A quan tity of semi putrid fish is put into a jar with some salt and suffered to rot until it is crowded with maggots it is then baked, worms and all over the fire and potted for after use The Burmans can no more live without <i>nga pi</i> than others without fish A better and cleaner sort of <i>nga pi</i> is prepared at and procured from Penang by the Anglo-Burmese, which though far superior is still excessively unbearable (<i>Fenwick</i>)</p> <p>Trade in Cured Fish—A large import and export trade exists, the for mer doubtless due to the difficulties in the way of the Indian curer Thus in</p>	<p>FISHERIES</p> <p>Rent. 293</p> <p>SALT FISH. 204 DRIED FISH 295</p> <p><i>Nga-pi.</i> 290</p> <p>TRADE. 297</p>

FISH	Industrial Products from Fish
TRADE IN CURED FISH	<p>the five years ending 1887 88 the total average imports were 12 088 846lb valued at £10 82 836 In comparison with the five years ending 1882 83 this shews a considerable increase the average for that period having been 8 921 583lb value £7 85 557 Not only is there an increase in imports but a larger proportion of the fish thus obtained is consumed in the country the re-exports shewing a decrease from an average of 444 447lb in the five years ending 1882 83 to 176 361lb in the later period The countries which form the chief sources of supply are Mekran and Sonmiani the Straits Settlements Arabia Persia Ceylon and Turkey in Asia The exports appear to have remained very steady during the past ten years though fluctuating considerably year by year Thus in the latter half of that period the total average quantity was 4 096 074lb value £3 55 756 while in the former it was 3 393 634lb value £1 82 857 The port from which much the largest proportion was exported last year was Madras which shipped 4 560 858 out of a total of 4 870 944lb while Ceylon formed the principal market importing 4 384 034lb of the whole It would be interesting to know to what extent the enlightened efforts to supply cheap salt had influenced the formation of the large Madras export trade as compared to any other province</p>
FISH OIL 298	<p>Fish Oil—The manufacture of oil from fish is carried on all along the Western coast of India and also in other parts It is obtained chiefly from the livers of sharks skates saw fishes cat fishes oil sardines and other kinds also from the heads intestines and even the whole body of some species The process of manufacture as carried out in India is very crude the livers are not washed but fresh or putrid clean or foul they are put into a pot and heated up to boiling point when the oil separates floats on the top and is skimmed off It undergoes no straining and is consequently impure and frequently rancid At Rangoon a large amount is manufactured the average quantity being said to exceed 77 tons a month The ordinary oil thus obtained is employed for the purposes of cooking lighting and in tanning leather while that extracted from the livers of species of <i>Carcharias</i> or shark is said to be an efficient substitute in medicine for cod liver oil Fish oil is a commercial article of considerable importance large quantities being exported to Europe In the official trade returns however no separate statistics exist so that definite information as to its extent can not be furnished</p>
FISH ROES 299	<p>Fish Roes—Obtained from several species are largely employed as an article of food in many parts of India and are sold in nearly every bazár of South and East Asia</p>
FISH SKIN 300	<p>Fish Skin—The rough skins of species of Sharks Skates and Rays are employed for polishing in several parts of the country Shagreen or shark's skin is chiefly used to cover scabbards</p>
FISH MAWS 301	<p>Fish Maws—Along with sharks fins form an important article of foreign trade See SHARKS FINS FISH MAWS &c in another volume</p>
FISH SCALES 302	<p>Fish Scales—The scales of the Mahasir (<i>Barbus tor</i>) are employed in the manufacture of playing cards The scales are cut in a circular form about 1½ inch in diameter and painted as required The principal seat of their manufacture is at Shahabad in Bengal</p>
MEDICINE 303	<p>Medicine—Generally speaking fish diet is considered by Hindu writers to be less heating than animal flesh less likely to excite an inordinate flow of bile more easily digested and to be particularly indicated in cases of diabetes Certain forms of dried fish are also held to be powerfully aphrodisiac and in Patna Dr Irvine informs us a concretion from the head of a fish called '<i>Sung sir mahi</i>' is supposed to have the same property The oil of the liver of the <i>Gadus morrhua</i>, or common Cod has well known properties as a nutritive tonic and alterative, and, as already mentioned it</p>

The Fishes of India.	(F Murray)	FISH.
<p>appears that the oil derived from the liver of species of <i>Carcharias</i> possesses similar valuable properties. The bile of certain species has fanciful properties ascribed to it by Natives in many localities, such as that of causing abortion of being a specific in night blindness, &c</p> <p>Agricultural Uses.—Fish rendered useless as food through putrefaction and the offal resulting from fish curing form valuable manure</p> <p>Sacred Uses—Hindu religion and mythology contain many references to the fish and certain species are employed in religious ceremonies.</p> <p>The following LIST of FISHES for the names and properties of which the writer is chiefly indebted to <i>Days Fishes of India</i> comprises those of chief economic value as sources of food oil isinglass, or shagreen When common to all the species of a genus, the economic properties will be found described in the remarks under the first Subsequent to the receipt of first proof the writer obtained however the <i>Fauna of British India</i>—FISHES—to which he has consequently been able to give references only</p>		
<i>Ætobatis narinari</i>	Day Fish Ind 743 Fau Br Ind I 59	306
<p>Vern—<i>Curruway tiriki</i> TAM <i>Il tenki</i> TEL; <i>Teherrundi</i> MALAY <i>Il tenki</i> VIZAG <i>Pari lung</i> MALAYS <i>Ra ta charm dah</i> ANDAMANS</p> <p>Habitat—The Red Sea seas and estuaries of India, to the Malay Archipelago and beyond</p> <p>Eaten raw and salted the livers are also employed to produce oil and the fins are exported to China with those of other rays skates and sharks</p>		
<i>Ailia coila</i>	Day Fish Ind, 488 Fau Br Ind I 134	307
<p>Vern—<i>Puttuli buns putta bounce-puttri</i> URIYA; <i>Man gli-ah-ni</i> SIND, <i>Vella kalada</i> TEL <i>Kajoli</i> RANGPUR, <i>Basanguti</i> GORAKPUR <i>Bdtausi</i> BHAGULPUR</p> <p>Habitat—From the Kistna and Orissa throughout the Indus Jumna and Ganges, after they leave the hills to their termination, also the rivers of Assam</p> <p>This fish is excellent eating</p>		
<i>Ambassis baculus</i>	Day Fish Ind 51 Fau Br Ind, I 485	308
<p>Vern—<i>Kung gi</i> PB <i>Nga koun mah nga sin sat</i> BURM</p> <p>Habitat—Fresh waters of Bengal Orissa and as far north as the Panjab also in Burma</p> <p>All the species of this genus though dry and insipid are eaten either fresh or sun-dried by the poorer classes of Natives They are valuable as a diet for these people since their structure allows of their being cured with out the use of expensive salt</p>		
<i>A commersom</i>	Day Fish Ind, 52 Fau Br Ind I 488	309
<p>Vern—<i>Selintan</i> MADRAS</p> <p>Habitat—Seas of India ascending rivers and estuaries</p>		
<i>A gymnocephalus</i>	Day Fish Ind 54 Fau Br Ind I 489	310
<p>Vern—<i>Chandi</i> URIYA</p> <p>Habitat—Seas of India</p>		
<i>A nama</i>	Day Fish Ind 50 Fau Br Ind I 484	311
<p>Vern—<i>Cart-hana, goa-chappi</i> URIYA, <i>Son dah</i> ASSAM <i>Buck ra, pom pi ah</i> N W P, <i>Muckni ched-du ah</i> PB <i>Pud-du put to-lah</i> SIND <i>Ak ku rati</i> TEL</p> <p>Habitat—Throughout the fresh waters of India Assam, and Burma</p>		
<i>A ranga</i>	Day Fish Ind, 51 Fau Br Ind I 485	312
<p>Vern—<i>Chandi BENG Chandi lal chandi</i> URIYA; <i>Chandi, N W P;</i> <i>Pi-dah</i> SIND <i>Gandrichri</i> MAR <i>Nga tenyet</i> BURM</p> <p>Habitat—Throughout India and Burma</p>		
<i>Amblypharyngodon atkinsonii</i>	Day, Fish Ind, 555 Fau Br Ind, I 290	313
<p>Vern—<i>Nga-pan-ma</i> BURM</p>		

FISH	Indian Fishes
	Habitat —Rivers throughout Burma. The species of this genus though bony, where abundant enter largely into the diet of the Natives
314	Amblypharyngodon melettina , <i>Day Fish Ind</i> , 555 <i>Fau Br Ind I</i> 292 Vern. — <i>Kali korafi</i> HIND; <i>Ular</i> TAM <i>Wumbá</i> , MALAY; <i>Paraga</i> KAN Habitat —The fresh waters of the Malabar coast and Southern India from the Nilghiris to Madras, also Ceylon (Bombay, according to Ouv and Val)
315	A mola <i>Day Fish Ind</i> , 555 <i>Fau Br Ind I</i> , 291 Vern. — <i>Kandi</i> BENG <i>Morara patia kerundi</i> URIYA <i>Moah</i> ASSAM <i>Mukni</i> PB <i>Talla maya</i> TEL <i>Nga beh-byu nga sen sap</i> BURM Habitat —Ponds and fresh water rivers from Sind throughout India (except the Malabar coast) Assam and Burma
316	Amphipnous cuchia <i>Day Fish Ind</i> , 656 <i>Fau Br Ind I</i> 69 EEL Eng Vern. — <i>Cuchia</i> BENG URIYA; <i>Dundu-paum</i> MADRAS <i>Nga shin</i> BURM Habitat —The fresh and brackish waters of the Panjáb extending to Bengal Orissa Assam and Burma Natives reject this as food and imagine that its bite is fatal to cattle
317	Anabas scandens , <i>Day Fish Ind</i> 370 <i>Fau Br Ind II</i> 367 CLIMBING FISH, Eng Vern. — <i>Coi</i> BENG, <i>Coi cown</i> URIYA <i>Coi</i> ASSAM <i>Sennal pauni-eyri</i> TAM; <i>Undi colli</i> MALAY <i>Kavaya</i> or <i>kawhy-ya</i> SING <i>Nga-pri</i> MUGH <i>Nga byays-ma</i> BURM <i>Haruan</i> MALAYS Habitat —Estuaries and fresh waters of India Ceylon and Burma This fish is most remarkable for its powers of living in the air, and can travel a long distance on land The boatmen of the Ganges carry them in moist earthen pots killing and cooking them as required They are highly esteemed as a nourishing food
318	Apocryptes bato <i>Day Fish Ind</i> , 302 <i>Fau Br Ind II</i> 278 Vern. — <i>Rutta</i> , URIYA Habitat. —Rivers of Orissa and Lower Bengal within tidal reach
319	A lanceolatus <i>Day Fish Ind</i> 301 <i>Fau Br Ind II</i> 277 Vern. — <i>Changua</i> BENG <i>Pitallu</i> URIYA <i>Nullah-ramah</i> TEL Habitat. —Seas of India
320	Arius burmanicus , <i>Day Fish Ind</i> , 458 <i>Fau Br Ind I</i> 173 Vern. — <i>Nga young</i> BURM Habitat. —Tidal rivers of Burma The several species are employed as food though of an inferior quality On the Western coast they are largely salted, and a considerable amount of isinglass is prepared by drying their air vessels
321	A gagora <i>Day Fish Ind</i> , 465 <i>Fau Br Ind I</i> , 185 Vern. — <i>Gagora</i> BENG <i>Nga-youn nga yeh</i> BURM Habitat. —Seas, estuaries, and tidal rivers of Orissa and Bengal, to Siam
322	A jatinus <i>Day Fish Ind</i> 466 <i>Fau Br Ind I</i> , 186 Vern. — <i>Yat gagora</i> BENG <i>Nga-youn nga yeh</i> BURM Habitat. —Estuaries and rivers of Bengal and Burma, ascending far above tidal reach
323	A macronotacanthus <i>Day Fish Ind</i> , 465 <i>Fau Br Ind I</i> , 184 Vern. — <i>Ihau-saludu</i> MALAYS Habitat. —Rivers of India

of Economic Value.	(<i>F Murray</i>)	FISH.
Arius sagor , <i>Day Fish Ind</i> , 461; <i>Fau Br Ind</i> , I, 178 Vern.— <i>Sagor</i> BENG Habitat.—From Bombay, through the seas and estuaries of India, very common at Batavia, where it is largely consumed		324
A. thalassinus , <i>Day Fish Ind</i> 463 <i>Fau Br Ind</i> , I, 181. Vern.— <i>Cuntea</i> URIYA, <i>Doddjella</i> VIZAGAPATAM Habitat.—From the Red Sea through those of Africa and India entering tidal rivers		325
Aspidoparia morar , <i>Day Fish Ind</i> 585 <i>Fau Br Ind</i> , I 338 Vern.— <i>Chippuah</i> chelluah HIND <i>Morar</i> , <i>morat</i> BENG <i>Bay</i> : URIYA; <i>Chula mou ah boreala</i> ASSAM <i>Pa-o-char chilwa</i> PB; <i>Karir re</i> SIND, <i>Amlit DEC</i> <i>Ulsa TEL</i> <i>Nga hpyen-bu yen-boung-sa</i> BURM Habitat.—Sind the Panjáb continent of India except the Western coast and localities south of the Kistna river Eaten by the Natives of many districts		326
Atherina forskalli , <i>Day Fish Ind</i> , 345 <i>Fau Br Ind</i> , II, 338 WHITEBAIT of Europeans in Malabar Vern.— <i>Ko-re-dah</i> ANDAMANS Habitat.—Seas of India It only reaches to a few inches in length and is most commonly captured during the cold season It is one of several genera certain species of which are indiscriminately termed 'whitebait' by Europeans and are dressed for the breakfast table' (<i>Day</i>)		327
Badis buchanaui , <i>Day Fish Ind</i> 128 <i>Fau Br Ind</i> II 80 Vern.— <i>Kahli-poi bändei kahli bundahn</i> : URIYA <i>Nabat ran-doh ni</i> ASSAM <i>Kundala ka sundara TEL</i> <i>Kala-pu ti ah chris</i> PB <i>Pin lay nga ba mah nga mi loung</i> , BURM Habitat.—Fresh waters of India and Burma		328
Bagarius yarrelli , <i>Day Fish Ind</i> , 495 <i>Fau Br Ind</i> I 194 FRESH WATER SHARK Eng Vern.— <i>Bunch gunch</i> HIND <i>Baag aari</i> BENG <i>Sah lun, cart cuntea</i> URIYA <i>Goreah</i> ASSAM <i>Rahti jellah TEL</i> <i>Guwch khird mulandah</i> MAR Habitat.—Large rivers of India and Java descending to the estuaries This fish attains 6 feet or more in length and though it takes a live bait is difficult to kill as it is sluggish goes to the bottom and generally escapes by destroying the tackle Like other SILURIDÆ it is more eaten by the poorer than the richer classes partly because the members of the family are forbidden to Muhammadans and partly because they are very foul feeders		329
Barbus ambassis , <i>Day Fish Ind</i> 576 <i>Fau Br Ind</i> , I 324 Vern.— <i>Bunkuas</i> URIYA <i>Kalay TEL</i> Habitat.—The rivers of Bengal Orissa Madras and Assam A small species attaining only about 3 inches in length The larger species of this genus are generally termed <i>Mahastir</i> , though this name is more correctly applied to <i>Barbus tor</i> only The species enumerated in this list are all employed as food		330
B. amphibius , <i>Day Fish Ind</i> , 574 <i>Fau Br Ind</i> I, 322 Vern.— <i>Uli perli</i> MALAY Habitat.—A fish generally attaining the length of 6 inches of the rivers of Central India Deccan Bombay the Western coast of India, Madras and up the coast as high as Orissa.		331
B. apogon , <i>Day Fish Ind</i> 575 <i>Fau Br Ind</i> I, 324 Vern.— <i>Nga ta see, nga lay-toun</i> BURM		332

FISH

Indian Fishes

- Habitat.**—The rivers of Tenasserim and throughout Burma (certainly as high as Mandalay) to the Malay Archipelago
- 333** ***Barbus carnaticus***, *Day Fish Ind* 563 *Fau Br Ind I*, 304
Vern—*Giddi kaoli*, HIND; *Poari candi saal candi shelli* TAM *Gid-pakke* KAN
Habitat—Rivers along the bases of the Nilghiris Wynaad and South Cánara Hills This is a large species attaining the weight of at least 25lb
- 334** ***B chagunio***, *Day Fish Ind*, 559 *Fau Br Ind I* 290
Vern—*Chaguni jerruah* BENG *Chaguni* BEHAR, *Puti keintah* ASSAM
Habitat.—The rivers of Bengal, Orissa Behar North Western Provinces Panjáb and Assam
 A medium sized fish attaining the length of at least 18 inches.
- 335** ***B chola***, *Day Fish Ind* 571 *Fau Br Ind I* 317
THE BITTER CARP
Vern—*Katcha karawa* HIND *Karrundi chola* BENG *Puttha kerundi* URIYA *Korun* TAM; *Chuddu paddaka* TEL *Nga khon ma nga lowah* BURM
Habitat.—The rivers of Bengal Orissa the Gangetic Provinces the Panjáb the Central Provinces, Madras Malabar and Wynaad, also Akyab and Burma to Mergui
Food As food this fish is bitter in some localities in Burma oil is obtained from it during the breeding season
- 336** ***B chrysopoma***, *Day Fish Ind*, 561 *Fau Br Ind I* 301
Vern.—*Mundutti* MALABAR
- 337** **Habitat**.—Fresh waters along the coast of India from Kutch to Bengal
- 338** ***B conchoniis***, *Day Fish Ind* 576 *Fau. Br Ind I*, 325
Vern—*Kunchon pungti* BENG
Habitat—The rivers of Assam Lower Bengal Orissa Behar the North Western Provinces the Panjáb and the Deccan
- 339** ***B cosuatis***, *Day Fish Ind* 581 *Fau Br Ind I*, 332
Vern—*Koswati* BENG *Pangut* MAR
Habitat—The rivers of Bengal North Western Provinces Deccan Bombay and down the Western coast as low as Cottayam in Travancore.
- 340** ***B filamentosus***, *Day Fish Ind* 582 *Fau Br Ind I* 333
THE RED TAILED CARP
Vern—*Sawaal candi chevalle* TAM *Curroah* MALAY
Habitat—Western coast and Southern India A very curious change occurs in this fish immediately after death the whole body becoming scarlet
- 341** ***B gelius***, *Day Fish Ind*, 577 *Fau Br Ind I*, 327
Vern—*Gili pungti* BENG *Cutturpoh* URIYA
Habitat—The rivers of Ganjam Orissa Bengal and Assam
- 342** ***B guganio***, *Day Fish Ind*, 579 *Fau Br Ind I* 328
Vern.—*Gugani* BENG; *Nga khon-mahgyi nga chong*, BURM
Habitat.—The Gangetic Provinces and Assam
- 343** ***B hexastichus***, *Day Fish Ind*, 565 *Fau Br Ind I*, 308
Vern—*Parrah-perli* MALAY *Lobura* ASSAM
Habitat.—A large fish attaining 3 feet in length, of the rivers in and around the Himálaya, Kashmír, Sikkim, and Assam
- 344** ***B kotus***, *Day Fish Ind*, 573 *Fau Br Ind I*, 319.
Vern.—*Nilusu* TEL
Habitat.—The Central Provinces and the Deccan, throughout the Kistna, Tambudra, and Godavari rivers

of Economic Value	(<i>J Murray</i>)	FISH.
Barbus micropogon , <i>Day, Fish Ind., 563 Fau Br Ind I, 304</i> Vern — <i>Coati candi</i> TAM Habitat.—The rivers around the base of the Nilghiris, Wynaad, and South Cánara range of hills, also of Mysore		345
B neilli , <i>Day Day Fish Ind, 569 Fau Br Ind, I, 314</i> Vern — <i>Khudri</i> MAR Habitat — Kurnúl on the Tambúdra river		346
B phutunio , <i>Day, Fish Ind 578 - Fau Br Ind I 327</i> Vern.— <i>Phutini pungti</i> BENG <i>Kudj kerundi</i> URIYA Habitat.—The rivers of Ganjam Orissa, and throughout Bengal and Burma		347
B punctatus , <i>Day, Fish Ind 577 Fau Br Ind I 326</i> Vern — <i>Putter perli</i> MALAY Habitat — The rivers of Malabar and the Coromandel coast		348
B puntio , <i>Day Fish Ind 582 Fau Br Ind I 334</i> Vern — <i>Pungti</i> BENG Habitat — Ponds and ditches of Bengal and Lower Burma		349
B sarana , <i>Day Fish Ind 560 Fau Br Ind I 300</i> Vern.— <i>Durhie giddi kaoli potah</i> HIND <i>Sarana-pungti sarana</i> , BENG <i>Sarana</i> URIYA <i>Sen-ni</i> ASSAM <i>Junduri</i> PB <i>Pap-pri, kuh-nah-ni</i> SIND <i>Pungella, kunnaku</i> TAM <i>Kannaku</i> TEL ; <i>Panjiri</i> MADRAS <i>Gid-pakke</i> KAN , <i>Nga khon-mah gyi nga-chong</i> BURM Habitat.—Rivers and tanks throughout India Assam and Burma.		350
B. sophore , <i>Day Fish Ind 566 Fau Br Ind I 309</i> Vern — <i>Pungti</i> BENG ; <i>Chadu-perigi</i> TEL ; <i>Sophore</i> SANS Habitat.—The rivers and ponds of Assam and the Khásia Hills		351
B stigma , <i>Day Fish Ind 579 Fau Br Ind, I 329</i> Vern — <i>Katcha karama pottiah</i> HIND , <i>Patia kerundi</i> URIYA <i>Chadu perigi</i> TEL <i>Katch ka-rawa</i> KAN <i>Nga khun-ma</i> BURM Habitat.—The rivers of Sind throughout India and Burma as high as Mandalay Though employed as food this fish is bitter		352
B stoliczkanus , <i>Day Fish Ind 577 Fau Br Ind I 326</i> Vern — <i>Nga thine gloy</i> BURM Habitat.—Eastern Burma.		353
B teno , <i>Day Fish Ind 580 Fau Br Ind I 330</i> Vern — <i>Tripungti</i> BENG <i>Kakachia kerundi</i> URIYA Habitat — The fresh waters of Bengal and Orissa to the Panjáb		354
B tetrapogus , <i>Day Fish Ind 572 Fau Br Ind I 318</i> Vern — <i>Til-pungti</i> BENG <i>Borajali</i> ASSAM <i>Pet toh i</i> , SIND Habitat.—The rivers tanks and ponds of Bengal Orissa the North Western Provinces the Panjáb Sind the Deccan and Assam		355
B ticto , <i>Day, Fish Ind, 576 Fau Br Ind I, 325</i> Vern — <i>Kaoli kotri</i> HIND <i>Kudj kerundi</i> URIYA <i>Kah-nipotiak</i> ASSAM Habitat.—Rivers and tanks throughout India and Ceylon		356
B tor , <i>Day Fish Ind, 564 Fau Br Ind I 307</i> Vern — <i>Naharm</i> HIND <i>Mahasir, mahasaula jora</i> BENG ; <i>Burapatra bura hetae mahsir lobura</i> ASSAM <i>Kukhsiah</i> PB <i>Joon gah petiah kurreah</i> SIND <i>Pá-mín candi</i> TAM Habitat — This fish the celebrated 'Mahasir' of sportsmen in India is found generally throughout India but grows to the largest size and is most abundant in mountain or rocky streams		357

FISH.	Indian Fishes
358	Barbus vittatus , <i>Day Fish Ind 582 Fau Br Ind, I, 333</i> Vern — <i>Kul:</i> HIND <i>Putti</i> URIYA Habitat.—The rivers of Kutch Mysore, Madras Wynaad, Malabar and Ceylon
359	Barilius barila , <i>Day Fish Ind 591 Fau Br Ind I, 384</i> Vern — <i>Perci</i> HIND <i>Gilland chasdrri barili</i> , BENG Habitat.—Rivers of the North Western Provinces, Central Provinces Bengal Orissa and Lower Assam The several species of this genus, like most other carps are largely employed as food by the Natives
360	B barna , <i>Day Fish Ind 592 Fau Br Ind I, 350</i> Vern — <i>Barna bali bhola bareli</i> BENG <i>Bahrri</i> URIYA <i>Balisundri os o-la</i> ASSAM Habitat.—Assam the Ganges and its branches rivers of Bengal and Orissa
361	B bendelisis <i>Day Fish Ind 590 Fau Br Ind I, 347</i> Vern — <i>Khoksa</i> BENG <i>Bahgra bahrri</i> URIYA <i>Pak tah kunnul dah rah burraah puck mah ri</i> PB <i>Aguskitti</i> TAM <i>Johra</i> MAR. Habitat.—Rivers of Assam the Himálaya, through the continent of India as far as the Western Ghats
362	B bola , <i>Day Fish Ind 594 Fau Br Ind I, 352</i> THE TROUT of Europeans in India Vern — <i>Buggarah</i> HIND <i>Bola goha</i> BENG <i>Buggush</i> URIYA <i>Korang</i> ASSAM Habitat.—Rivers of North Western Provinces Orissa Bengal Assam and Burma This is a very game fish generally called Trout by the English in India takes the fly well and is one of those termed ' <i>Raja mas</i> ' or chief of the fishes' in the Assam rivers
363	B gatensis , <i>Day Fish Ind 592 Fau Br Ind I, 349</i> RIVER CARP OR NILGERRY TROUT of Europeans in India Vern — <i>Choari árt-candi</i> TAM Habitat.—Rivers of the Western Gháts Malabar and the Nilghiri hills up to about 5,000 feet above the level of the sea
364	B guttatus , <i>Day Fish Ind 593 Fau Br Ind, I, 351</i> Vern — <i>Nga-la wah</i> BURM Habitat.—River Irrawadi, from Prome to Mandalay
365	Belone annulata , <i>Day Fish Ind 510 Fau Br Ind I, 419</i> Vern.— <i>Pahmum kolah</i> , TAM <i>Wahlah kuddera</i> VIZAGAPATAM <i>Toda</i> MALAYS Habitat.—Seas and estuaries of India The several species of Belone, or 'Gar fish,' though generally of indifferent quality, are employed as food by the Natives.
366	B cancila , <i>Day Fish Ind 511 Fau Br Ind I, 420</i> Vern — <i>Kangkila</i> , BENG <i>Gungituri</i> URIYA <i>Coco-min</i> TAM <i>Coahlan morrahlá</i> MALAY; <i>Nga-ohpoung yoh, nga-phou yo</i> BURM Habitat.—Fresh waters of India Ceylon, and Burma
367	B strongylura , <i>Day, Fish Ind 512 Fau Br Ind, I, 421</i> THE LONG NOSED FISH Vern.— <i>Cungár</i> SIND, <i>Ushi-collarchi, coco-min</i> TAM <i>Wedlah muhu</i> TEL; <i>Coplah</i> , MALAY <i>Kuddera</i> , VIZAGAPATAM, <i>Toda</i> , MALAYS <i>Thák-o-du-ná-dah</i> ANDAMANS Habitat.—Seas and coasts of India
368	Callichrous bimaculatus , <i>Day, Fish Ind, 476 Fau Br Ind, I, 131</i> THE BUTTER FISH

of Economic Value	(J. Murray)	FISH
<p>Vern.—<i>Kam-pabda chechra</i> BENG <i>Gung-wah ri, puf ta</i>, HIND <i>Pob-tah</i> URIYA; <i>Pah-boh</i> ASSAM; <i>Pufia, gungwah, pallu</i> PS; <i>Dimmon</i> SIND <i>Chelahwahlah chotah wahlah</i> TAM <i>Dika duma</i> TEL; <i>Gugli gungul, purma</i> MAR <i>Godla</i> KAN</p>		
<p>Habitat.—Fresh waters throughout India Ceylon and Assam. Although rarely exceeding a foot in length the species of <i>Callichrous</i> are excellent as food and are considerably used by Europeans</p>		
<p><i>Callichrous macrophthalmus</i>, <i>Day Fish Ind</i> 478 <i>Fau Br Ind</i>, I 132</p>		369
<p>Vern.—<i>Nga na than nga xwin bouk</i> BURM</p>		
<p>Habitat.—Fresh waters of Madras Assam and Burma</p>		
<p><i>C. malabaricus</i>, <i>Day Fish Ind</i> 478 <i>Fau Br Ind</i>, I 133</p>		370
<p>Vern.—<i>Chota-wahlah</i> TAM <i>Mungi wahlah</i> MALAY</p>		
<p>Habitat.—Malabar coast of India</p>		
<p><i>Caranx affinis</i>, <i>Day Fish Ind</i> 219 <i>Fau Br Ind</i> I 158</p>		371
<p>THE HORSE MACKEREL</p>		
<p>Vern.—<i>Warriparah</i> TAM <i>Battaparra</i> MALAY</p>		
<p>Habitat.—Seas of India</p>		
<p><i>C. oblongus</i>, <i>Day Fish Ind</i> 222 <i>Fau Br Ind</i> I, 163</p>		372
<p>Vern.—<i>Rothul dah</i> ANDAMANS</p>		
<p>Habitat.—Seas of India</p>		
<p><i>C. rotteri</i>, <i>Day Fish Ind</i> 213 <i>Fau Br Ind</i> I 150</p>		373
<p>Vern.—<i>Komara-parah</i> TAM <i>Sora-parah</i> TEL <i>Woragd</i> VIZAG</p>		
<p>Habitat.—Seas of India</p>		
<p><i>Carassius auratus</i> <i>Day Fish Ind</i> 552 <i>Fau Br Ind</i> I, 283</p>		374
<p>THE GOLDFISH or GOLDFIN CARP</p>		
<p>Vern.—<i>Nukka</i> MAR</p>		
<p>Habitat.—River Inderani above Puna (Watson). Not indigenous to India or only possibly so in Upper Burma (Day)</p>		
<p><i>Carcharias acutidens</i>, <i>Day Fish Ind</i>, 713 <i>Fau Br Ind</i> I 11</p>		375
<p>Habitat.—Coasts of Sind and the Indian Ocean. All the species of this genus are valued for the oil obtained from their livers their gelatinous fins their skin which is employed as shagreen and by the poor for their flesh which is extensively eaten both fresh and salted</p>		
<p><i>C. acutus</i>, <i>Day Fish Ind</i>, 712 <i>Fau Br Ind</i> I 10</p>		376
<p>Vern.—<i>Parramas sorrah</i> TAM; <i>Sem sorrah</i> TEL <i>Parl sorrah</i>, MALAY</p>		
<p>Habitat.—Seas of India</p>		
<p><i>C. ellioti</i>, <i>Fish Ind</i> 716 <i>Fau Br Ind</i> I, 15</p>		377
<p>Vern.—<i>Paducan adugu-pal sorrah</i> TAM <i>Pal sorrah</i> VIZAG</p>		
<p>Habitat.—The Seas of India not uncommon at Karachi</p>		
<p><i>C. gangeticus</i>, <i>Day Fish Ind</i> 715 <i>Fau Br Ind</i> I, 13</p>		378
<p>Habitat.—Seas of India ascending rivers to above tidal influence. This is one of the most ferocious of Indian sharks and frequently attacks bathers in the Hooghly at Calcutta</p>		
<p><i>C. limbatus</i>, <i>Day Fish Ind</i>, 716 <i>Fau Br Ind</i> I 17</p>		379
<p>Habitat.—Very common along the sea borders of India, extending through the Indian Ocean. It attains at least 6 feet in length</p>		
<p><i>C. macioli</i>, <i>Day Fish Ind</i>, 713 <i>Fau Br Ind</i> I, 12</p>		380
<p>Vern.—<i>Pala sorrah</i>, TEL</p>		
<p>Habitat.—A small shark of the Indian seas.</p>		
<p><i>C. melanopterus</i>, <i>Day Fish Ind</i>, 715 <i>Fau Br Ind</i>, I 14</p>		381
<p>Vern.—<i>Cawal sorrah nella vekal sorrah raman sorrah mukhan sorrah, boka sorrah ran sorrah</i> TAM</p>		

FISH	Indian Fishes
	Habitat. —Seas of India A very large shark, the liver of one of which is said by Day to have weighed 270lb It is, perhaps of all the species the most prized as an oil yielding fish
382	Carcharias menisorrh , <i>Day Fish Ind 716 Fau Br Ind, I 16</i> Vern —Karamáti sorrah ciga sorrah, TEL. Habitat. —The seas of India A large shark attaining 12 feet or more in length
383	C (Odontaspis) tricuspidatus , <i>Day Fish Ind 713 Fau Br Ind I 27</i> Habitat. —A large shark abounding in the seas of Sind, and attaining a length of at least 20 feet
384	Catla buehanani , <i>Day Fish Ind 553 Fau Br Ind I 287</i> Vern —Catla HIND BENG PB Barkur URIYA Boassa N W P Tamra BOMB Botchi IRL Tay li SIND Nga thaing BURM Habitat. —Rivers and tanks of Sind the Panjáb through India to the Kistna and eastwards through Bengal and Burma to Siam This fish is largely employed for stocking tanks and is much esteemed as an article of food when not over 2 feet in length larger ones are coarse.
385	Chaetodon vagabundus , <i>Day, Fish Ind, 105 Fau Br Ind II, 4</i> Vern —Pah nu-dah ANDAMANS Habitat —The seas of India
386	Chanos salmoneus , <i>Day Fish Ind 651 Fau Br Ind I, 403</i> The MILK FISH or WHITE MULLET Vern —Tulu candai TAM Palah bontah TEL Hu mín KAN Pu-mín TULU Habitat —The seas of India and tanks of fresh and brackish water in South Cánara It was introduced into the latter artificial habitat by Hyder Ali and still thrives
387	Chatoessus chacunda , <i>Day Fish Ind 632 Fau Br Ind I, 386</i> Vern —Chacunda BENG Muddirah, TEL Kore-pag dah ANDAMAN Habitat. —The seas and estuaries of India and Burma The several species of this genus along with other members of the CLUPEIDÆ or her rings are captured in great quantity, and largely consumed by the native population
388	C maninna , <i>Day Fish Ind, 633 Fau Br Ind, I 386</i> Vern —Mackunda URIYA Habitat. —Fresh waters of Sind and the districts watered by the Indus and its branches also the main streams of the Ganges Jumna Brahma putra and Mahanuddi through the tanks and estuaries of India and Assam except the Deccan South and Western India and Ceylon
389	C modestus , <i>Day Fish Ind 633 Fau Br Ind I 386</i> Vern —Nga la-pay BURM Habitat —Along the Bassein River as high as the In gay gyi lake, also the Salwein at Moulmein
390	C nasus , <i>Day Fish Ind 634 Fau Br Ind, I 387</i> Vern —Kome URIYA; Muddu candai TAM Kome, TEL; Nunah, MALAY Pedda kome VIZAG Habitat. —Seas of India This fish is good eating, but bony
391	Chela argentea , <i>Day Fish Ind, 601, Fau Br Ind., I., 364</i> WHITE CARP Vern. —Chaya vellachi vellachi candi TAM Habitat. —Bowary river (at the base of the Nilghirts), Cauvery river, and the rivers of Mysore This and the other species enumerated below are eaten by the Natives

of Economic Value.	(J Murray)	FISH
Chela bacalla , Day, Fish Ind, 603 Fau Br Ind I 367 Vern— <i>Chelliah</i> HIND; <i>Bacalla</i> BENG; <i>Jellahri</i> URIYA <i>Badishaya</i> TEL Habitat.—The rivers and tanks of India except those of Malabar Madras, Mysore and parts of the Deccan	392	
C clupeioides , Day Fish Ind 602 Fau Br Ind I 366 Vern— <i>Tikani</i> DEC <i>Baluki</i> MAR; <i>Netteli vellache-kende</i> TAM Habitat.—The rivers of Cutch Jubbulpur the Deccan Madras Mysore and Burma This species is specially good eating	393	
C gora , Day, Fish Ind 600 Fau Br Ind I 362 Vern— <i>Chel hul</i> HIND; <i>Ghora chela</i> BENG <i>Hum catchari</i> URIYA; <i>Bounchi kundul</i> PB Habitat.—Rivers of Sind, the Panjáb the North Western Provinces Bengal Orissa and Assam	394	
C jorah , Day Fish Ind 599 Fau Br Ind I 361 Vern— <i>Jorah</i> MAR Habitat.—Beema river near Paigaoon in the Deccan	395	
C phulo , Day Fish Ind 602 Fau Br Ind I 365 Vern— <i>Dunnahri</i> , HIND <i>Phul chela</i> BENG <i>Sel konah</i> ASSAM <i>Tak bung ka chael</i> PB <i>Muk ka</i> SIND Habitat.—The rivers and ponds of Bengal Orissa Central India and the Deccan, as far southwards as the Tambadra and Kistna	396	
C sardinella , Day Fish Ind 600 Fau Br Ind I 363 Vern— <i>Nga kun nyat</i> BURM Habitat.—Irrawadi river at Rangoon also the Salween at Moulmein	397	
C sladoni , Day Fish Ind 600 Fau Br Ind I 363 Vern— <i>Nya yin boun sa</i> BURM Habitat.—Irrawadi river as far north as Mandalay	398	
C untrahi , Day Fish Ind, 601 Fau Br Ind I 364 Vern— <i>Untrahi</i> URIYA Habitat.—Mahanaddi river in Orissa, also the Cauvery and Colerun in Southern India	399	
C alkootee , Day Fish Ind, 599 Fau Br Ind, I 362 Vern— <i>Alkuti</i> MAR Habitat.—Rivers of the Deccan (Doubtful species)	400	
Chiloscyllium indicum , Day Fish Ind 726 Fau Br Ind I 34 Vern— <i>Corangan sorrah</i> TAM <i>Etti</i> MALAY <i>Boki sorrah ra sorrah</i> VIZAG, <i>Yu tokay</i> MALAYS <i>Pus hi</i> BELUCH Habitat.—The seas of India	401	
Chirocentrus dorab , Day Fish Ind 652 Fau Br Ind I 368 Vern— <i>Kunda kundah</i> URIYA <i>Kiru wahlah mulu alley</i> TAM <i>Wah lah</i> , TEL <i>Parang-parang</i> MALAYS Habitat.—The seas of India	402	
Chorinemus lysan , Day Fish Ind, 231 Fau Br Ind II 175 Vern— <i>Parah</i> , HIND <i>Toal-parah</i> , TAM <i>Aken-parah</i> VIZAG; <i>Tallang raya</i> MALAYS Habitat.—The seas of India Though considerably employed as food, the members of this genus are dry and rather tasteless	403	
C moadetta , Day, Fish Ind, 230 Fau Br Ind, II, 174 Vern— <i>Tol parah</i> VIZAG Habitat.—Red Sea and seas of India.	404	

FISH.	Indian Fishes
405	<p>Chrysophrys berda, <i>Day, Fish Ind 140; Fau Br Ind II, 44</i> BLACK ROCK FISH of Europeans in Malabar Vern—<i>Kala madwan</i> HIND <i>Dun-de-a jarras</i> SIND, <i>Currie currapu mattawa</i> TAM <i>Kalamara</i> TEL <i>Ari</i> MALAY <i>Mā-ru ki dah</i> ANDA MAN Habitat—The seas of India to the Malay Archipelago and beyond This fish is excellent eating, greatly excelling the other species and is common in Malabar until July</p>
406	<p>C sarba, <i>Day Fish Ind 142 Fau Br Ind II 47</i> Vern—<i>Sufada maddawa</i> HIND <i>Vellamattawa</i> TAM <i>Chitchilli</i> TEL <i>Tin til</i>, BELUCH Habitat—The seas of India especially abundant on the Madras coast As food it is inferior to the <i>berda</i></p>
407	<p>Cirrhitina cirrhosa, <i>Day, Fish Ind 547 Fau Br Ind I 277</i> Vern—<i>Ven kandi</i> TAM <i>Arusu</i> TEL Habitat—Godavery Kistna and Cauvery rivers, and generally in Southern India A very active fish fair eating but bony</p>
408	<p>C fulungee, <i>Day Fish Ind, 549 Fau Br Ind I, 280</i> Vern—<i>Fulungi</i> MAR Habitat—Rivers of Poona and the Deccan</p>
409	<p>C latia, <i>Day Fish Ind, 548 Fau Br Ind I 279</i> Vern—<i>Kala batta</i> BENG <i>Behrah tellarru</i> PB <i>Curru</i> SIND <i>Wattu nah</i> MAR Habitat—The rivers of Bengal Orissa the North West Provinces the Panjāb Sind the Deccan and along the Himālaya</p>
410	<p>C mrigala, <i>Day Fish Ind 547 Fau Br Ind I 278</i> Vern—<i>Mrigala naim</i> HIND <i>Rewah</i> BENG <i>Mrigale mirgah</i> URIYA <i>Mor ah ki</i> SIND <i>Nga kyin nga gyein</i> BURM <i>Mirgal mrigala</i> SANS Habitat—The rivers and tanks of Bengal the North West Provinces the Panjāb Sind, Kutch the Deccan, and Burma An excellent fish for stocking tanks</p>
411	<p>C reba, <i>Day Fish Ind 549 Fau Br Ind, I 279</i> Vern—<i>Rewah</i> HIND <i>Batta</i> BENG <i>Chetchua-porah</i> URIYA <i>Sunni</i> PB and SIND <i>Pil aringan</i> TAM <i>Ilemose chittahri pullarasu</i> TEL; <i>Lassim</i> ASSAM <i>Boggui kōlis</i> MAR Habitat—Rivers throughout India</p>
412	<p>Clarias magur, <i>Day Fish Ind 485 Fau Br Ind I 115</i> Vern—<i>Magur mah gur</i> BENG <i>Mangri</i> PATNA and MONGHIR <i>Magu rah</i> URIYA <i>Kug ga</i> PB <i>Yerri-vale</i> TAM <i>Marpu</i> VIZAG <i>Nga khu</i> BURM and MUGH Habitat—Fresh and brackish waters of the plains of India Burma Ceylon and the Malay Archipelago As food this fish is deemed highly nourishing and is extensively salted in Burma</p>
413	<p>Clupea fimbriata, <i>Day, Fish Ind 637 Fau Br Ind, I, 273</i> SARDINE of Europeans in India Vern—<i>Charri-addi</i> HIND, <i>Kich uk-lonar</i> SIND <i>Punduringa</i>, TAM <i>Cuttay charlay</i> MALAY Habitat—Red Sea and the seas of India Employed extensively as food and also in the preparation of fish-oil All the members of this genus are much captured for food by the Natives, and some are considered delicious by Europeans.</p>
414	<p>C ilisha, <i>Day Fish Ind 640 Fau Br. Ind I, 276</i> THE SABLE or SHAD FISH HILSA</p>

of Economic Value	(F Murray)	FISH.
<p>Vern.—<i>Hilsa shsha</i> BENG <i>Ruri</i> of the Ganges; <i>Dumra</i> of the Indus <i>Pulla</i> SIND <i>Uluu</i> TAM <i>Pulasa pulasu</i> or <i>palasah</i> TEL; <i>Olam</i> <i>min</i> MADRAS <i>Nga tha louk</i> BURM <i>Ikan truboh</i> MALAYS</p> <p>Habitat—Persian Gulf and coasts of India and Burma passing up the large rivers to breed</p> <p>These fish are excellent as food until they have deposited their ova, when they become thin and positively unwholesome Their flavour has been compared to a combination of that of the salmon and herring but though highly esteemed for the table they are rather rich and difficult of digestion</p>		
Clupea longiceps , <i>Day Fish Ind</i> 637 <i>Fau Br Ind I</i> 373		415
THE MALABAR OIL SARDINE		
<p>Vern—<i>Mutthi charlay karlay</i> MAL <i>Mutthi</i> KAN <i>Lonar</i> SIND; <i>Li gur</i> BELUCH</p> <p>Habitat—Sind and the Western coast of India more rarely found on the Eastern Ceylon and Andaman coasts. Large quantities of oil are made from this species in Malabar</p>		
C variegata , <i>Day Fish Ind</i> 639 <i>Fau Br Ind I</i> 375		416
<p>Vern—<i>Nga la-bi</i> BURM</p> <p>Habitat—The Irrawaddi and its branches</p>		
Coilia ramcarati , <i>Day, Fish Ind</i> , 631 <i>Fau Br Ind, I</i> 396		417
<p>Vern—<i>Urialli</i> URIYA</p> <p>Habitat—The rivers and estuaries of Bengal</p>		
Corica soborna , <i>Day, Fish Ind</i> 642 <i>Fau Br Ind, I</i> 378		418
<p>Vern—<i>Cut wai urai</i> god has URIYA</p> <p>Habitat—The rivers of Bengal and Orissa</p>		
Cybum commersonii , <i>Day Fish Ind</i> 255 <i>Fau Br Ind II</i> 211		419
THE SEER OR SEIR FISH		
<p>Vern.—<i>Konam mah-wu laachi ah ku lah</i> TAM <i>Chambam</i> MALAY <i>Ikan tanggi</i> MALAYS</p> <p>Habitat—Seas of India The species of this genus when of the proper size are considered amongst the most delicate of all marine fishes If under a foot in length they are dry from 1½ to 2½ feet they are most excellent while above this they become coarse</p>		
C guttatum , <i>Day Fish Ind</i> 255 <i>Fau Br Ind II</i> 210		420
THE SPER OR SEIR FISH		
<p>Vern—<i>Wingeram</i> VIZAG <i>Arrakiah</i> MALABAR</p> <p>Habitat.—The seas of India. Good eating especially if cooked when quite fresh salts well</p>		
C lineolatum , <i>Day Fish Ind</i> , 256 <i>Fau Br Ind, II</i> 212		421
THE SEER OR SEIR FISH		
<p>Vern—<i>Barim kutti</i> MALAY <i>Tanggi</i> MALAYS</p> <p>Habitat—Seas of India</p>		
Cynoglossus lingua , <i>Day Fish Ind</i> 433 <i>Fau Br Ind, II</i> , 445		422
SOLE of Europeans in India		
<p>Vern—<i>Kot aralu</i> TAM <i>Ikan-ledak</i> MALAYS</p> <p>Habitat.—Seas and estuaries of India Highly esteemed for the table It is mentioned by Ainslie as light nutritious, delicate, and one of the fish that may be safely given to invalids</p>		
Danio dangila , <i>Day Fish Ind</i> 596 <i>Fau Br Ind, I</i> , 356		423
<p>Vern.—<i>Dham</i> BENG</p> <p>Habitat.—The rivers of Bengal Behar, and the Himálaya, at Darjeeling also of the hills above Akyab The prettily-marked fish con</p>		

FISH.	Indian Fishes
	stituting this genus, which are nearly allied to the Tench, are considerably used as food
424	<p>Danio devario, <i>Day Fish Ind 595 Fau Br Ind I 354</i> Vern.—<i>Debari</i> BENG <i>Bonkuaso</i> URIYA <i>Da bah, dukri-e</i> N W P ; <i>Khan-ge mal le pur-ran dah</i> PB <i>Chay la ri</i> SIND Habitat.—The ponds and rivers of Bengal, the North West Provinces the Panjáb Sind Orissa the Deccan and Assam</p>
425	<p>D. malabaricus, <i>Day Fish Ind 595 Fau Br Ind I 355</i> Vern.—<i>Porah cunjá candi</i> TAM Habitat.—The Western coast of India and Ceylon</p>
426	<p>D. neilgherriensis, <i>Day Fish Ind 597 Fau Br Ind, I 357</i> Vern.—<i>Cowise</i> TAM Habitat.—Rivers on the Nilghiri Hills</p>
427	<p>D. rerio, <i>Day Fish Ind 597 Fau Br Ind I, 358</i> Vern.—<i>Poncha gerald</i> URIYA Habitat.—Rivers of Bengal and of the country extending down the Coromandel coast to Masulipatam</p>
428	<p>Diagramma crassispinum <i>Day Fish Ind 78 Fau Br Ind I 514</i> BLACK ROCK FISH of Europeans in Malabar Vern.—<i>Tamúlu punnel</i> TEL Habitat.—The seas of India It attains 2 feet or more in length and is good eating</p>
429	<p>Discognathus lamta, <i>Day Fish Ind 527 Fau Br Ind I, 246</i> HILL TROUT of Europeans Vern.—<i>Korafi kaoli</i> HIND <i>Choak si</i> BENG <i>Putter-chettah</i> N W P <i>Dhoguru kurka</i> PB <i>Kul korava</i> TAM <i>Pandi pakke</i> KAN Habitat.—Rivers and mountain streams throughout India and Ceylon This fish is good eating but putrefies very rapidly after death</p>
430	<p>Drepane punctata, <i>Day, Fish Ind 116 Fau Br Ind II, 21</i> Vern.—<i>Pullu torriti</i> TAM <i>Thetti</i> TEL <i>Pundithi</i> MALAY <i>Latte terla</i> <i>Vizag Punnur</i> SIND <i>Nga shengna</i> BURM <i>Rupi chanda</i> CHITTAG <i>Shengna roet</i> ARRAK <i>Shuk</i> BELUCH <i>Gun na to-dash</i> AND Habitat.—Seas of India It is in most places esteemed as food</p>
431	<p>Dussumeria acuta, <i>Day Fish Ind 647 Fau Br Ind I 399</i> SARDINE of Europeans in Malabar Vern.—<i>Punduouringa</i> TAM <i>Kurie</i> MALAY <i>Tamban bulat</i> MALAYS <i>O pul-dah</i> AND Habitat.—From Sind through the seas of India Oantor says this species like the true Sardine may be preserved <i>a huile</i> It is very common in Malabar and is excellent eating</p>
432	<p>Echeneis naucrates, <i>Day Fish. Ind 257 Fau Br Ind, II 214</i> Vern.—<i>Putthu muday</i> MALAY, <i>Ubbay</i> TAM <i>Ala mottah</i> VIZAG <i>Guddimi</i> MALAYS Habitat.—Seas of India The Malays consider these fish to be a valuable manure for fruit trees</p>
433	<p>Elacate nigra, <i>Day Fish Ind 256 Fau Br Ind II, 213</i> Vern.—<i>Cuddul-verarl</i> TAM <i>Pedda mottah</i> VIZAG Habitat.—Seas of India, to Japan</p>
434	<p>Eleotris butis, <i>Day Fish Ind, 315 Fau Br Ind, II, 296</i> Vern.—<i>Kullakray</i> MALAY Habitat.—Seas and estuaries of India.</p>
435	
436	<p>E. fusca, <i>Day Fish Ind, 313 Fau Br Ind, II, 293</i> Vern.—<i>Bundi, balah kera</i> URIYA <i>Cul-cándalum</i>, TAM ; <i>Pállan</i> MALAY Habitat.—Brackish and fresh waters of the whole coast of India.</p>

of Economic Value.	(F Murray)	FISH
<i>Eleotris ophiocephalus tumifrons</i> , Day, Fish Ind, 312, Fau Br Ind, II, 293 Vern.— <i>A-rig-dah</i> , <i>mu tuk-dah</i> , AND Habitat.—The coasts of the Andamans		437
<i>Elops saurus</i> , Day Fish Ind 649 Fau Br Ind, I, 401 Vern.— <i>Ullahh</i> TAM; <i>Yallugu</i> , <i>jinnagow</i> TEL Habitat.—Seas of India		438
<i>Engraulis hamiltonii</i> , Day Fish Ind, 625 Fau Br Ind, I 389 Vern.— <i>Purawah</i> VIZAG Habitat.—Found throughout the seas of India The species of this genus are largely consumed by the Natives		439
<i>E indicus</i> , Day Fish Ind 629 Fau Br Ind I, 394 WHITEBAIT of Europeans in India Vern.— <i>Netteli teran guni</i> TAM <i>Nattu</i> TEL; <i>Bunga ayer badah</i> MALAYS <i>Ju-rú cart dah</i> AND Habitat.—Seas and tidal rivers of India. It is extensively employed as food cooked in the same way as whitebait.		440
<i>E malabaricus</i> , Day Fish Ind 625 Fau Br Ind I 389 Vern.— <i>Pur-rehan</i> TAM <i>Monangá</i> MALAY <i>O-pul d h</i> AND Habitat.—Coasts of Sind and through the seas of India		441
<i>E purava</i> , Day Fish Ind 628 Fau Br Ind I 393 Vern.— <i>Phasa</i> BENG <i>Pussai tampara</i> ÚRIYA <i>Pedda-purawah</i> , VIZAG Habitat.—Seas and estuaries of both sides of India		442
<i>E telara</i> , Day Fish Ind 627 Fau Br Ind. I 392 Vern.— <i>Phasa phasah fessah pencha</i> BENG; <i>Tampara</i> URIYA <i>Telara</i> , DINAJPUR <i>Nga hta yawet</i> BURM Habitat.—Rivers of Orissa Bengal Cachar and Burma		443
<i>Ephippus orbis</i> , Day Fish Ind 115 Fau Br Ind, II 20 Vern.— <i>Nalla torriti</i> TAM <i>Kol lid dah kow lid dah</i> , AND Habitat.—Seas of India		444
<i>Equula daura</i> , Day Fish Ind 240 Fau Br Ind, II 188 Vern.— <i>Dacer-karah</i> VIZAG <i>Rama karé</i> TAM Habitat.—Ceylon and the Coromandel coast The small fish constituting this genus are eaten fresh or sun dried after being soaked in sea water Their thin and bony structure renders them easily cured without the application of strong brine or salt but they are very apt to putrify in moist weather and if consumed during the monsoon months tend to set up visceral irritation resulting in diarrhoea or dysentery		445
<i>E insidiatrix</i> , Day Fish Ind, 242 Fau Br Ind II, 191 Vern.— <i>Paarl cúrchí</i> MALAY Habitat.—Seas of India Like the former species it is dried on the Malabar coast		446
<i>E ruconius</i> , Day Fish Ind, 242 Fau Br Ind II 192 Vern.— <i>Rucon chanda</i> BENG <i>Tunka chandi</i> ÚRIYA Habitat.—Seas and tidal rivers of India		447
<i>Etroplus maculatus</i> , Day Fish Ind 415 Fau Br Ind II, 429 Vern.— <i>Cundahla</i> ÚRIYA <i>Shellel</i> , TAM, <i>búrahak chella kassu</i> TAM <i>Pullattay</i> MALAY <i>Rallia</i> SING Habitat.—Fresh waters along the coast of Madras and from South Canara along Malabar also found in Ceylon It extends from the sea at least 60 or 80 miles inland		448

FISH.

Indian Fishes

- 449** *Etroplus suratensis*, *Day Fish Ind 415, Fau Br Ind, II, 430*
 Vern.—*Titul* has HIND *Cundahla* ÚRIYA *Karsaar pillimchan*, TAM
Senel has cashi-mora TEL *Coralha*, SING
 Habitat.—Fresh and brackish waters, along the coasts of Ceylon and India as far as Orissa
- 450** *Eutropichthys vacha*, *Day Fish Ind 490 Fau Br Ind, I, 128*
 Vern.—*Ni much*, HIND *Váchá* BENG *Butchua nandi butchua*
 ÚRIYA *Chel li* SIND *Nga myen kouban katha boung* BURM
 Habitat.—From the Panjáb through the large rivers of Sind, Bengal, and Orissa and variety *E. burmanicus* in Burma This species attains upwards of a foot in length and is good eating
- 451** *Gagata cenia*, *Day Fish Ind 492 Fau Br Ind I 208*
 Vern.—*Jungla* BENG *Puttuh chettah* ÚRIYA; *Cenia*, SIND *Nga nan young* BURM
 Habitat.—Rivers of Bengal and Orissa, the Jumna Ganges, and Indus, also those of Burma
- 452** *Gerres filamentosus*, *Day Fish Ind 98 Fau Br Ind I 537*
 Vern.—*Udan* TAM *Jaggari* TEL *Wúdaahwah wúdan* VIZAG *Po ra chal dah* AND; *Nga-wet sat* ARRAK
 Habitat.—Seas of India This is the best eating of all the species of GERRES though some of the others are also used as food to a small extent They are mostly eaten by the indigent classes being little esteemed whilst fresh on account of their numerous bones and deficiency in flavour As they salt and dry well however large numbers are thus prepared in many parts of the country for future use or export
- 453** *Glyphidodon sordidus*, *Day Fish Ind 385 Fau Br Ind II 386*
 Vern.—*Calamoiapota* TEL *Chék-mud dah* AND
 Habitat.—Seas of India Used for food
- 454** *Glyptosternum lonah*, *Day Fish Ind, 496 Fau Br Ind I 196*
 Vern.—*Lonah* MAR
 Habitat.—The rivers of the Deccan Eaten like other SILURIDÆ, by the poorer classes
- 455** *Gobius giuris*, *Day Fish Ind 294 Fau Br Ind II 266*
 Vern.—*Gulu* HIND *Gulah bah gulah* ÚRIYA *Uluway* TAM *Issaki dundu tsikideondoa* TEL *Kurpah* MAR *Warti pulah puan kurden* MALAY *Ab-bro-ny* KAN *Gálu-wah, boul-la* PB *Gálu* SIND *Pu dah* AND *Nga tha boh* BURM
 Habitat.—Fresh waters throughout the plains of India Ceylon and Burma The small variety (? species) *kokiús* never exceeds a span and appears to be entirely confined to the sea and estuaries along the coast of India and the Andamans
- 456** *G. striatus*, *Day Fish Ind 292 Fau Br Ind II, 262*
 Vern.—*Mahturi, naolis* (=young) ÚRIYA *Cundallum uluway* TEL *Cun dallum* TAM
 Habitat.—Fresh and back waters of Madras and Kanara
- 457** *Haplochilus panchax*, *Day Fish Ind 523 Fau Br Ind I 417*
 Vern.—*Pang chah* BENG; *Kana huri bar-ro-gaddi* ÚRIYA *Cho-to dah* AND *Nga saki* MUGH
 Habitat.—From Orissa through the Lower Province of Bengal Burma and Siam to the Malay Archipelago also the Andamans
- 458** *Harpodon neherens*, *Day Fish Ind, 505 Fau Br Ind, I, 412*
 THE BOMBAY DUCK
 Vern.—*Nehare bumalo, bummaloh*, BENG *Cucak sawahri coco mottah* TEL; *Bummelo* MALAY *Wangara-was*, MADRAS *Wana-motta* VIZAG, *Luli*, MALAYS

of Economic Value	(<i>J Murray</i>)	FISH
<p>Habitat.—Seas and estuaries of India, most common at Bombay but decreasing in numbers down the Malabar coast. This fish is highly esteemed as food, whether fresh or salted in the latter form it is extensively employed as a relish with curries and is known as ‘Bombay duck’.</p>		
Hemirhamphus buffonis , <i>Day Fish Ind</i> , 516 <i>Fau Br Ind</i> , I, 427		459
<p>Vern—<i>Ku-dé-rock o-dah</i> ANDAMANS</p>		
<p>Habitat.—The seas and tidal rivers of Bombay, Bengal and the Andamans. The roes of the fishes of this genus are collected largely on the Malabar coast of India, where they are esteemed a great delicacy.</p>		
H cantoni , <i>Day Fish Ind</i> 514 <i>Fau Br Ind</i> I 423		460
<p>THE GUARD FISH of the Straits Settlements</p>		
<p>Vern.—<i>Toda-pendek</i> MALAY</p>		
<p>Habitat.—Bombay Malabar Madras, and the seas of India</p>		
H ectuntio , <i>Day Fish Ind</i> , 517 <i>Fau Br Ind</i> I, 427		461
<p>Vern—<i>Gungituri</i>, URIYA <i>Nga-phoung yo</i> BURM</p>		
<p>Habitat.—The river Hooghly, and the tidal streams of Akyab, Burma and Siam</p>		
H reynaldi , <i>Day Fish Ind</i> 515 <i>Fau Br Ind</i> , I, 425		462
<p>Vern—<i>Morru</i> MALAY</p>		
<p>Habitat.—The seas of India (<i>Day</i>) Malabar and the tanks around Calcutta (<i>Watson</i>)</p>		
Labeo angra , <i>Day Fish Ind</i> 541 <i>Fau Br Ind</i> I 267		463
<p>Vern—<i>Kharsa mochna</i> HIND, <i>Paungs morala</i> BENG <i>Lassim</i> ASSAM <i>Nga lu</i> BURM</p>		
<p>Habitat.—The rivers of Bengal Orissa Assam and Burma. The several species of this genus enumerated below are employed as food by the Natives. Some such as the <i>Rohu</i> are also highly esteemed by Europeans.</p>		
L arisa , <i>Day Fish Ind</i> , 544 <i>Fau Br Ind</i> , I 272		464
<p>Vern—<i>Arisa</i> BENG <i>Coal</i> TAM <i>Nga-lu</i> BURM</p>		
<p>Habitat.—The Wynaad and Bowany rivers at the foot of the Nil ghiri hills also the Cauvery river</p>		
L boga , <i>Day Fish Ind</i> , 543 <i>Fau Br Ind</i> I 269		465
<p>Vern—<i>Bangum-batta boga</i> BENG; <i>Kala battali</i> URIYA <i>Arisa</i> TEL <i>Kinda min coal arinsa candi</i> TAM <i>Kyauk-nya lu</i> BURM</p>		
<p>Habitat.—The rivers and tanks of the Gangetic Provinces Madras, and Burma</p>		
L calbasu , <i>Day Fish Ind</i> 536 <i>Fau Br Ind</i> I 259		466
<p>Vern—<i>Kala beinse</i> HIND <i>Kalbasu kundna cuggera</i> BENG <i>Nulla gandu-menu</i> IEL <i>Kala-beinse</i> URIYA <i>Di PB Di hi</i> SIND <i>Dai</i> CUTCH <i>Kurri-minu</i> KAN <i>Mahli</i> ASSAM <i>Nga nek-pya nga-nu than nga ong tong</i> BURM</p>		
<p>Habitat.—The fresh waters of the Panjáb Sind Cutch the Deccan Southern India and Malabar and from the Kistna through Orissa, Bengal, and Burma</p>		
L diplostomus , <i>Day Fish Ind</i> 540 <i>Fau Br Ind</i> , I 265		467
<p>Vern—<i>Mohayli gaywah</i> HIND; <i>Kul ka-batta</i>, BENG; <i>Gid giddah</i> PB; <i>Nepura</i>, ASSAM</p>		
<p>Habitat.—Along the Sind hills and Himálaya, also a native of the Brahmaputra in Assam</p>		
L dussumeri , <i>Day Fish Ind</i> , 538 <i>Fau Br Ind</i> , I 262		468
<p>Vern—<i>Tuli</i> MALAY</p>		
<p>Habitat.—Rivers of South Malabar, Ceylon, and perhaps Bombay</p>		

FISH	Indian Fishes
469	<p><i>Labeo fimbriatus</i>, <i>Day Fish Ind</i> 536 <i>Fau Br Ind, I</i> 258 Vern.—<i>Bahrum</i>, URIYA; <i>Vencandi</i>, <i>shaal</i> TAM <i>Ruchu gandu menu</i> TEL; <i>Bobri</i> MAR Habitat.—The rivers of the Panjáb, Sind, and the Deccan also of Southern India at least as far as Orissa It is a fairly large fish, attaining a length of 1½ feet and though bony is good eating</p>
470	<p><i>L. gonius</i>, <i>Day Fish Ind</i> 537 <i>Fau Br Ind I</i> 261 Vern.—<i>Cursa collúse</i> HIND <i>Kurchi kurchi goni</i> BENG; <i>Cursua</i> URIYA <i>Courie bahtur</i> ASSAM <i>Mosul</i> TEL <i>Cir-ro-oh</i> SIND <i>Nga pay nga-dane, nga hu</i> BURM Habitat.—The Indus in Sind through the North Western Provinces Bengal and Orissa to Ganjam as low as the Kistna also Assam and Burma It is a large fish attaining the length of 5 feet and is much used for stocking tanks</p>
471	<p><i>L. kontius</i>, <i>Day Fish Ind</i> 539; <i>Fau Br Ind I</i>, 264 Vern.—<i>Carramanni caru-mulí candi</i> TAM Habitat.—The rivers along the base of the Nilghiris and the Cauvery and Coleroon in all their branches down to the coast</p>
472	<p><i>L. nandina</i>, <i>Day Fish Ind</i> 535 <i>Fau Br Ind I</i> 258 Vern.—<i>Nandin</i> BENG; <i>Nga-ohn-don nga-ne-pyah nga-yin pounsa</i> BURM Habitat.—The fresh waters of Bengal Assam and Burma</p>
473	<p><i>L. pangusia</i>, <i>Day Fish Ind</i> 541 <i>Fau Br Ind I</i> 266 Vern.—<i>Loanni pengusiya</i> BENG Habitat.—Rivers and tanks of the Himaláya found also generally throughout Sind the Deccan and the North West Provinces Bengal Cachar and Assam</p>
474	<p><i>L. rohita</i>, <i>Day Fish Ind</i> 538 <i>Fau Br Ind I</i> 262 THE ROHO or ROHT Vern.—<i>Rui rowi rohita rui mutchli</i> BENG <i>Ruhu</i> URIYA <i>Rui</i> ASSAM <i>Nga myit chin nga myit tsan ni</i> BURM Habitat.—Fresh waters of Sind and from the Panjáb through India and Assam to Burma A large fish of 3 feet or more in length esteemed excellent as food and propagated with care in ponds in Bengal Yields oil for which it is principally employed in the North West Provinces U O Dutt remarks that the bile of this species is employed in medicine by the Hindus</p>
475	<p><i>Lactarius delicatulus</i>, <i>Day Fish Ind</i> 245 <i>Fau Br Ind II</i> 196 Vern.—<i>Sudumu</i> TELUGU <i>Purruwah</i> MALAY <i>Chundawah</i> VIZAG Habitat.—Seas of India It is insipid, but is eaten, either fresh or salted by the Natives</p>
476	<p><i>Lates calcarifer</i>, <i>Day Fish Ind</i>, 7 <i>Fau Br Ind I</i> 440 COCK UP Calcutta NAIR FISH Malabar Vern.—<i>Begti bhekti</i> BENG <i>Durruah bekkut</i> URIYA <i>Dangara</i> SIND <i>Painni min koduwa karona</i> TAM <i>Pandu kopah pandu menu</i> TEL; <i>Nuddi min, nair min</i> MALAY; <i>Padumená</i> VIZAG <i>Kuduwa</i> MADRAS <i>Nga tha-dyk</i> ARRAC <i>Koral baor</i> CHITTAGONG <i>Todah</i> AND; <i>Kahadit</i> BURM <i>Ikan siyakup</i> MALAYS Habitat.—Seas back waters and mouths of tidal rivers. This fish is excellent eating when obtained from the vicinity of large rivers. It salts well and from it some of the best Tamarind fish is prepared</p>
477	<p><i>Lepidocephalichthys guntea</i>, <i>Day, Fish Ind</i>, 609 <i>Fau Br Ind., I</i>, 220 Vern.—<i>Gánteah gáteah, bilgagora</i> BENG, <i>Kondaturi, guphart, jubbi-cowri</i>, URIYA; <i>Nga-tha-ley-doh</i>, BURM</p>

of Economic Value.	(J. Murray)	FISH.
<p>Habitat.—The rivers and tanks of India; except those along the Malabar coast Mysore, and south of the Kistna Eaten by Natives</p>		
Lethrinus rostratus (miniatus) , Day, Fish Ind 134 Fau Br Ind, II, 37		478
Vern.— <i>Po-tang-dah</i> AND		
Habitat. —Seas of India		
Lobotes surinamensis , Day Fish Ind 84 Fau Br Ind I 519		479
Vern.— <i>Chota bekkut</i> URYAH Musalli TAM Parrandi MALAY; <i>Isan batu</i> MALAYS		
Habitat. —East coast of Africa, and seas of India. It is excellent as food		
Lutjanus argentimaculatus , Day Fish Ind 37 Fau Br Ind I, 472		480
THE RED ROCK COD of the Straits Settlements		
Vern.— <i>Rangá</i> TEL Singara, <i>senan karawa</i> MADRAS; <i>To go-re-dah</i> ANDAMANS		
Habitat. —Throughout the seas of India This fish attains upwards of 2 feet in length and is good eating The other species of the genus are good as food though some are insipid and are extensively salted and dried in many localities		
L. decussatus , Day Fish Ind 47 Fau Br Ind I, 481		481
Vern.— <i>Yu-win-dah</i> ANDAMANS		
Habitat. —Seas of India especially abundant on the coasts of the Andamans where it is readily captured by bait		
L. erythropterus (annularis) Day Fish Ind 32 Fau Br Ind I 466		482
Vern.— <i>Susta</i> URIYA; <i>Chirtah</i> VIZAG <i>An-na kah-ro-dah</i> ANDAMANS		
Habitat. —Seas of India It is captured all the year round at Madras but is most abundant during the cold months		
L. fulviflamma Day Fish Ind 41 Fau Br Ind I 475		483
Vern.— <i>Shemhara currumay</i> TAM <i>Vella-chembolay</i> MALAY <i>Antika dundiawah</i> VIZAG		
Habitat. —Seas of India especially abundant off the coasts of Madras		
L. jahngarah , Day Fish Ind 40 Fau Br Ind I 474		484
Vern.— <i>Purruwa</i> URIYA <i>Sillaw</i> VIZAG		
Habitat. —Seas of India It attains two feet or more in length is esteemed as food and is extensively cured by drying on the coast of Orissa		
L. johnii , Day Fish Ind 42 Fau Br Ind I 476		485
Vern.— <i>Chembolay</i> MALAY <i>Dundiawah</i> VIZAG <i>Nga-pá ni</i> BURM		
Habitat. —Seas of India.		
Macrones aor , Day Fish Ind 444 Fau Br Ind I 479		486
Vern.— <i>Aor</i> BENG <i>Alli</i> or <i>addi</i> , <i>arriah alli</i> <i>gugah alli</i> URIYA; <i>Singala yang go-ah</i> PB <i>Cambu kelleli</i> , TAM <i>Mukul-jellah muti jella</i> TEL <i>Singhari</i> SIND <i>Singhala</i> MAR <i>Nga-joung</i> BURM		
Habitat. —Rivers throughout Sind and India to Burma The species of Macrones here enumerated are employed as food by the poorer classes but are of inferior quality being rather insipid		
M. cavasius , Day, Fish Ind 447 Fau Br Ind I 155		487
Vern.— <i>Kavasi tengara</i> BENG <i>Guntea cuntea</i> URIYA, <i>Vella kelleli cutta</i> TAM <i>Muti jella nahra jella</i> TEL <i>Singti surah</i> MAR <i>Nga sin sine</i> BURM		
Habitat. —Rivers from Sind throughout India, Assam and Burma		
M. corsula , Day Fish Ind 446 Fau Br Ind I, 153		488
Vern.— <i>Punjab-gaggah</i> URIYA <i>Nga-ike</i> BURM		
Habitat. —Rivers from Orissa through Bengal and Assam		

FISH.	Indian Fishes
489	Macrones leucophaea , <i>Day Fish Ind.</i> 449 <i>Fau. Br Ind.</i> I, 158 Vern — <i>Nga-pet leh nga-nouk-thawa</i> , BURM Habitat.—Rivers of Burma.
490	M malabaricus , <i>Day Fish Ind</i> 450 <i>Fau Br Ind.</i> I 160 Vern — <i>Cutti min</i> TAM Habitat — Malabar coast of India and the Wynaad extending inland to the ghâts in South Cánara
491	M punctatus , <i>Day Fish Ind</i> 445, <i>Fau Br Ind</i> I, 153 Vern — <i>Sholang kellelé psetta kellelé</i> TAM Habitat — The Bowany river at the base of the Nilghiris
492	M tengara , <i>Day Fish Ind</i> 447 <i>Fau Br Ind</i> I 156 Vern — <i>Kuttahrah</i> HIND <i>Tengara tengrah</i> BENG <i>Bikuntia</i> URIYA <i>Ting ga-rah</i> ASSAM; <i>Karaal ting ga-rah</i> PB <i>Sakujella</i> TEL <i>Nga sin-sine</i> BURM Habitat — Northern India, the Panjáb and Assam
493	Mastacembelus armatus , <i>Day Fish Ind</i> 340 <i>Fau Br Ind.</i> II, 334 THE SPINED EEL OR THORNY BACKED EEL Vern — <i>Barua</i> HIND <i>Bahm bummi gouti</i> BENG URIYA, <i>Bahm kahm gro-age</i> PB and SIND <i>Kul-aral sha ta-rah</i> TAM; <i>Mudi bom mi day</i> TEL <i>Nga maway-doh nga</i> BURM Habitat — From Sind throughout the fresh and brackish waters of the plains and hills of India Ceylon and Burma It attains 2 feet or more in length and is good eating especially when curried or fried
494	M panchalus , <i>Day Fish Ind</i> 340 <i>Fau Br Ind</i> II 333 THE SMALL SPINED EEL Vern — <i>Sugar</i> HIND <i>Turi bahru</i> URIYA <i>Tu rah</i> ASSAM; <i>Par-pa raal</i> TEL <i>Chen da la garchi gro-age</i> PB Habitat — Deltas of large rivers of India and localities near the sea Good eating whether fresh or salted
495	Megalops cyprinoides , <i>Day Fish Ind</i> 650 <i>Fau Br Ind</i> I 402 Vern — <i>Punnikaw naharn</i> URIYA; <i>Moran cundai</i> TAM <i>Cunnay</i> MALAY <i>Kundinga</i> VIZAG <i>Opul dah</i> AND <i>Nga tan youet</i> BURM Habitat — Fresh waters and estuaries of India and Ceylon It is occasionally captured in rivers but much more frequently in tanks
496	Mugil corsula , <i>Day, Fish Ind</i> , 354 <i>Fau Br Ind</i> II, 349 THE MULLET Vern — <i>Undala</i> HIND <i>Corsula in ge-lé</i> BENG <i>Kahunda</i> URIYA <i>Hurd-wah re</i> PB; <i>Nga sen</i> BURM Habitat — Rivers and estuaries of Bengal and Burma extending far above tidal influence in the fresh water It attains 1½ foot in length and is considered excellent eating Ainslie remarks regarding this genus they are the most excellent fish in India but are perhaps a little too fat and rich for those who are delicate They are used both in the fresh and salted state and are much prized by the natives The spawn salted and dried forms a kind of <i>caviar</i> called by the Italians <i>boborago</i> (<i>Mat Ind</i> I 227) The same objection to its use however exists as with the OPHIOCEPHALIDÆ, certain classes refusing to eat the mullet owing to the resemblance of its head to that of a serpent
497	M cunnesius , <i>Day, Fish Ind</i> 349 <i>Fau Br Ind</i> II 342 THE MULLET Vern — <i>Mahlak</i> , MALAY <i>Cunnesi</i> VIZAG; <i>Sada-paranda</i> MADRAS Habitat.—Seas of India
498	M hamiltonii , <i>Day Fish Ind</i> , 354 <i>Fau Br Ind.</i> II, 349 THE MULLET Habitat.—Rivers of Burma

of Economic Value.	(F Murray)	FISH
Mugil ocar , <i>Day Fish Ind</i> , 353 <i>Fau Br Ind</i> , II, 384 MULLET		499
Vern.— <i>Kola-kende mahlah</i> , MALAY Habitat.—Seas of India and China The season for capturing these fish along the western coast commences about the middle of November when they swarm close inshore in order to enter estuaries and the mouths of large rivers to deposit their ova and extends to about February The roes are collected and dried in the sun with or without the use of salt		
M parua , <i>Day Fish Ind</i> 350 <i>Fau Br Ind</i> , II 344 MULLET		500
Vern.— <i>Taru</i> BENG ; <i>Pasi kende, paranda</i> MADRAS Habitat.—Seas and estuaries of India It attains at least 1½ feet in length and is commonly captured for food in the Hooghly at Calcutta.		
M planiceps (tade), <i>Day Fish Ind</i> 350 <i>Fau Br Ind</i> II, 344 MULLET		501
Vern.— <i>Bangon</i> BENG <i>Jumpul</i> MALAYS Habitat.—Seas, estuaries, and tidal rivers of India Common in the Hooghly		
M poecilus , <i>Day Fish Ind</i> , 351 <i>Fau Br Ind</i> , II, 345 MULLET		502
Vern.— <i>Cunnumbu</i> MALAY Habitat.—Rivers of Bombay and the Western coast of India especially common during the colder months		
M seheli <i>Day Fish Ind</i> 355 <i>Fau Br Ind</i> , II 350 MULLET		503
Vern.— <i>Magi</i> URIYA Habitat.—Seas of India.		
M waigiensis <i>Day Fish Ind</i> 359 <i>Fau Br Ind</i> II, 356 FRESH WATER MULLET Eng		504
Vern.— <i>Do-dah</i> ANDAMANS Habitat.—Throughout the seas of India ascending rivers to the limit of tidal influence during the monsoon It attains a foot or more in length and is good eating		
Muraena sathete <i>Day Fish Ind</i> 668 <i>Fau Br Ind</i> I, 77 Vern.—Sathete BENG		505
Habitat.—Bay of Bengal and Penang especially affecting estuaries		
M tile <i>Day Fish Ind</i> 668 <i>Fau Br Ind</i> I 76 THE EEL		506
Vern.— <i>Tile</i> BENG, <i>Vellangá</i> TEL <i>Ahír</i> MAR <i>Chemlá-pamú</i> , MADRAS <i>Palug dah</i> ANDAMANS Habitat.—Seas and estuaries of Bengal, ascending tidal rivers and common in the Hooghly at Calcutta		
Muraenesox telabon , <i>Day Fish Ind</i> 661 <i>Fau Br Ind</i> I 90 THE BAMBOO FISH		507
Vern.— <i>Kotah kulisi-pambu</i> , TAM ; <i>Culim-poun</i> , TEL ; <i>Tala-bon</i> , VIZAG <i>Boschi</i> , ANDAMANS Habitat.—Seas of India, attaining 10 feet or more in length		
Nandus marmoratus , <i>Day Fish Ind</i> 129 <i>Fau Br Ind</i> II 82 Vern.—Vadhul HIND ; <i>Latha, gudtha</i> , BENG ; <i>Bodon gossiporah</i> , URIYA <i>Gad-gud-dí bad-vád-hi</i> ASSAM, <i>Mussoassah</i> , PB ; <i>Septi isoppitay</i> TEL <i>Mutahrí</i> , MALAY		508
Habitat.—Fresh and brackish waters of India and Burma, common in ditches and inundated fields		

FISH.	Indian Fishes
509	<i>Nemacheilus zonatus</i> , Day Fish, Ind, 618 Fau Br Ind, I, 233 Vern.— <i>Mugah</i> BENG Habitat.—Throughout the Jumna and Ganges and their affluents, Birbhun, Assam and Orissa
510	<i>Notopterus chitala</i> , Day Fish Ind 654 Fau Br Ind, I 407 Vern.— <i>Chitala chitol</i> BENG; <i>Chitul</i> URIYA; <i>Si tul</i> ASSAM; <i>Gundun</i> , SIND Habitat.—A large fish attaining 4 feet or more in length found in the fresh waters of Sind Lower Bengal Orissa Assam Burma and Siam Hamilton Buchanan writes The belly is uncommonly rich and well flavoured but the back contains numerous small bones and a strong prejudice exists against using this fish as food owing to its being supposed to live on human carcasses
511	<i>N kapiat</i> , Day, Fish Ind 653 Fau Br Ind I 406 Vern.— <i>Moh</i> HIND <i>Pholoe</i> BENG <i>Pull</i> URIYA <i>Ambutan-mahlah chota mahlah</i> TAM <i>Kau-du li</i> ASSAM <i>Moh but purri</i> PB <i>Nallah tattah</i> MYSORE <i>Nga hpeh nga phe</i> BURM Habitat.—Fresh and brackish waters of India It grows to 2 feet or more in length and is salted in Burma
512	<i>Ophichthys boro</i> , Day Fish Ind 664 Fau Br Ind I 94 Vern.— <i>Boro</i> <i>harancha hiyala</i> BENG Habitat.—Seas and estuaries of India The natives in some parts of Bengal imagine that this fish proceeds from the ear of a porpoise
513	<i>Ophiocephalus barca</i> Day Fish Ind 365 Fau Br Ind II 361 THE WALKING FISH Vern.— <i>Barca</i> BENG <i>Bora-chang</i> BUTAN Habitat.—Large rivers of the Bengal Presidency All the fish of this genus have hollow cavities in their heads an amphibious system of respiration are able to exist for a lengthened period out of water and can travel some distance over the ground especially where it is damp They are all useful as food and the possibility of carrying them in moist vessels for a long distance renders them extremely valuable Some classes of natives however object to them on account of the resemblance of their heads to those of serpents
514	<i>O gachua</i> Day Fish Ind 367 Fau Br Ind II 364 THE WALKING FISH Vern.— <i>Dheri dhok</i> HIND <i>Chenga choyung</i> URIYA <i>Chengah</i> ASSAM <i>Doarra</i> PB <i>Para korava munru</i> TAM <i>Karavu</i> MALAY <i>Mah korava</i> KAN <i>Korah-mottah</i> VIZAG; <i>Chad-dah</i> AND Habitat.—Fresh waters throughout India, Ceylon Burma, and the Andamans Described by Thomas as an excellent live bait
515	<i>O marulius</i> , Day Fish Ind 367 Fau Br Ind II 360 THE WALKING FISH or MURREL Vern.— <i>Pu murl</i> HIND; <i>Sal</i> URIYA <i>Ha-al</i> ASSAM <i>Kubrah sal daulah</i> PB <i>Pu verari</i> TAM <i>Pula chapa</i> TEL <i>Choari verari curavu</i> MALAY <i>Havina murl</i> KAN <i>Murrul</i> MAR; <i>Sowarah</i> VIZAG; <i>Nga yan dyne</i> BURM Habitat.—Fresh waters (principally rivers) from Ceylon and India to China This fish is described by Thomas as affording excellent sport either with live bait or fly It is one of the best of the OPHIOCEPHALIDÆ as a food fish and is excellent for stocking tanks.
516	<i>O punctatus</i> , Day Fish Ind, 367 Fau Br Ind, II 364 THE BLACK CABOOSE Vern.— <i>Phal dhok</i> HIND; <i>Gorissa, gurrie cartua goras</i> URIYA and ASSAM <i>Dullunga</i> PB <i>Dhoali</i> SIND; <i>Korava pa a-korava</i> TAM; <i>Muttah</i> TEL <i>Beli-korava</i> KAN; <i>Nga-ain</i> MUGH

of Economic Value	(J Murray)	FISH
Habitat —Commonly found in fresh waters, of the plains, preferring stagnant ponds to streams		
Ophiocephalus striatus , <i>Day Fish Ind</i> , 366; <i>Fau Br Ind</i> , II, 363		517
THE WALKING FISH OF MURREL.		
Vern.— <i>Morru</i> murl dheri murl, HIND; <i>Sol chena</i> BENG; <i>Sola</i> URIYA; <i>Verarl</i> currupu verarl TAM; <i>Sowarah, kora muttageddasa</i> TEL; <i>Verarl wrahl</i> MALAY; <i>Mutt h</i> VIZAGAPATAM; <i>Kúchina murl</i> KAN; <i>Lulla</i> SING; <i>Nga-an-di</i> MUGH; <i>Nga-yaw</i> BURM; <i>Ihan haruan</i> MALAYS		
Habitat .—Fresh waters throughout the plains of India. Like <i>O. marulius</i> , it affords excellent sport, is good as food though bony and is a very good stock for tanks. The Telangs are said to employ this fish in one of their religious ceremonies.		
Opisthopterus tartoor , <i>Day Fish Ind</i> 646; <i>Fau Br Ind</i> I 384		518
Vern.— <i>Tartoore</i> VIZAGAPATAM		
Habitat .—From Sind through the seas of India		
Oreinus plagiostomus , <i>Day Fish Ind</i> 530; <i>Fau Br Ind</i> I 250		519
THE KASHMIR TROUT		
Habitat .—Rivers of Afghanistan, Kashmir and Butan. All the species of <i>Oreinus</i> are used as food.		
O. richardsoni , <i>Day Fish Ind</i> 530; <i>Fau Br Ind</i> I 250		520
THE KUMAON TROUT		
Vern.— <i>Asla</i> NEPAL		
Habitat .—The rivers of Nepal, Butan and the Sub-Himalayan range		
O. sinuatus , <i>Day Fish Ind</i> 529; <i>Fau Br Ind</i> I 248		521
TROUT of Europeans		
Vern.— <i>Gul guli</i> saul PB; <i>Yis</i> KASH		
Habitat .—Afghanistan and Himalayan rivers not extending to the plains far from the base of the hills. It attains 2 feet in length and is pretty good eating but bony; it is too rich for some people but does not deleteriously affect those accustomed to it.		
Ospromenus nobilis , <i>Day Fish Ind</i> 372; <i>Fau Br Ind</i> II 370		522
Habitat .—Rivers of North-eastern Bengal and Assam extending into those of the hills. Like the next species it is excellent eating and good for stocking tanks but as it is a very promiscuous feeder, care must be taken to prevent its obtaining access to foul substances.		
O. olfax , <i>Day Fish Ind</i> 372; <i>Fau Br Ind</i> , II 369		523
THE GOURAMY		
Habitat .—A native of China and the Malay Archipelago but introduced into tanks near Calcutta, Madras and the Nilgiris. It attains 20 lb or more in weight and is excellent eating when kept in clean water.		
Osteogobius militaris , <i>Day Fish Ind</i> 469; <i>Fau Br Ind</i> , I 190		524
Vern.— <i>Pond keliti</i> TAM; <i>Pond ketti</i> MALAY		
Habitat .—Seas, estuaries and tidal rivers of India. It is eaten by the poorer classes and is one of the species which furnish fish maws from which isinglass is manufactured.		
Otolithus maculatus , <i>Day Fish Ind</i> , 196; <i>Fau Br Ind</i> II 127		525
Vern.— <i>Birralli</i> , URIYA		
Habitat .—Seas of India. Both species of this genus are eaten, and their air vessels collected for isinglass.		
O. ruber , <i>Day Fish Ind</i> , 196; <i>Fau Br Ind</i> , II, 128		526
PÉCHEPIERRE, French at Pondicherry		

FISH	Indian Fishes
	<p>Vern.—<i>Yarang gig</i> MALAYS Habitat—Seas of India A large fish, attaining 2½ feet or more in length and fairly good for the table</p>
527	<p>Pangasius buechanani, <i>Day Fish Ind</i>, 470 <i>Fau Br Ind</i>, I 142 Vern—<i>Cula kellethi</i> TAM <i>Banka jella</i> TEL, <i>Jellum</i> URIYA Habitat—The large rivers and estuaries of India Assam and Burma It attains upwards of 4 feet in length and is eaten though a foul feeder</p>
528	<p>Pellona motius, <i>Day Fish Ind</i>, 643 <i>Fau Br Ind</i>, I 381 Vern.—<i>Ursi alise</i> URIYA Habitat—Rivers of Assam Bengal, and Orissa descending as low as the coast Used as food</p>
529	<p>P sladeni, <i>Day Fish Ind</i> 645 <i>Fau Br Ind</i>, I 383 Vern—<i>Nga sen bya</i> BURM Habitat—River Irrawaddi as high as Mandalay It is eaten by the Burmans</p>
530	<p>Perilampus atpar, <i>Day Fish Ind</i> 598 <i>Fau Br Ind</i> I 359 Vern—<i>Kachhi atpar</i> BENG <i>Bonkuaso</i> URIYA <i>Mor-ti ah</i> PB <i>Bi dah</i> SIND <i>Arku konissi</i> TEL <i>Nga man-dan ya-paw-nga nga-phyin gyan</i> BURM Habitat—Rivers of Sind throughout India and Burma The carps of this genus are eaten by natives</p>
531	<p>P laubuca, <i>Day Fish Ind</i> 598 <i>Fau Br Ind</i> I 360 Vern—<i>Dannakrah</i> HIND <i>Layubuka dankena</i> BENG <i>Bankoe</i> URIYA; <i>Moh do-ni konah her-bag gi</i> ASSAM <i>Cun che-ise</i> N W P <i>Nga me-loung</i>, BURM Habitat—The rivers of Bengal Orissa Central India, Ganjam Assam and Burma</p>
532	<p>Plagusia bilineata, <i>Day Fish Ind</i> 431 <i>Fau Br Ind</i> II 452 Vern.—<i>Aralu</i> TAM <i>Ikan ledah</i> MALAYS <i>Jerri-potu</i> VIZAGAPATAM Habitat—Seas of India Used as food</p>
533	<p>Platax terra, <i>Day Fish Ind</i> 235 <i>Fau Br Ind</i>, II 182 Vern—<i>Cha la dah gu na dah</i> ANDAMANS Habitat—Seas of India Russell and Oantor both remark that the flavour of this fish is excellent</p>
534	<p>Platycephalus insidiator, <i>Day Fish Ind</i> 276 <i>Fau Br Ind</i> II 238 CROCODILE FISH of Europeans in Malabar Vern—<i>Ulpathy</i> TAM <i>Irrwa</i> TEL <i>Nga-paying ki</i> MUGH <i>A-ra wud-dah chau ur-dah</i> AND Habitat—Seas of India Eaten by the lower classes of natives but much dreaded on account of the severe irritative wounds caused by its spines</p>
535	<p>Ptoctosus arab, <i>Day Fish Ind</i> 483 <i>Fau Br Ind</i> I 113 Vern—<i>Ingeli</i> VIZAG <i>Murghi</i> MALAY <i>Similang karong</i> MALAYS Habitat—Seas of India Wounds from the pectoral spines of this fish are much dreaded as they occasion phlegmonous inflammation or even tetanus</p>
536	<p>P canis, <i>Day, Fish Ind</i>, 482 <i>Fau Br Ind</i>, I 113 Vern—<i>Kani-magur</i> BENG <i>Irung keli-etti</i> TAM; <i>Li mi-dah bondah</i> ANDAMANS Habitat—The estuaries of India Burma and the Malay Archipelago A large fish 3 feet or more in length the flesh of which is supposed by the Malays of Batavia to have emmenagogue properties</p>
537	<p>Polyacanthus cupanus, <i>Day Fish Ind</i> 371 <i>Fau Br Ind</i> II 368 Vern—<i>Punnah</i>, TAM <i>Heb-bu-ti</i>, TEL, <i>Ta-but-ti</i>, KAN <i>Caringanah</i>, <i>wannutti</i>, MALAY</p>

of Economic Value	(F Murray)	FISH.
<p>Habitat.—Fresh waters of Malabar and the Coromandel coasts, often found in ditches paddy fields and other shallow waters. Although of small size it is employed as food by the lower classes of Natives. Jerdon remarks that wounds from the spines of this fish cause severe burning pain which lasts for two or three hours.</p>		
<p>Polynemus indicus, <i>Day Fish Ind 179 Fau Br Ind, II 105</i> ROWBALL of Europeans at Vizagapatam</p>		538
<p>Vern.—<i>Seli sula</i> <i>suliah selliah</i> BENG <i>Dara Bom</i>; <i>Tahlun kala</i> TAM <i>Bhat MAR</i> <i>Pole-kala</i> MADRAS <i>Maga boshi</i>, VIZAG; <i>Yeta</i> MALAY <i>Lukwah</i> ARRAKAN <i>Kwey-yeng</i> TAVOY; <i>Ikan-kuro</i>, MALAYS; <i>Katha</i> or <i>ka ku-yun</i> BURM</p>		
<p>Habitat.—The seas of India. All the fish of this genus are excellent as food and also form one of the principal sources of fish maws.</p>		
<p>P paradiseus <i>Day Fish Ind 176 Fau Br Ind II, 102</i> MANGO FISH of Europeans in Calcutta</p>		539
<p>Vern.—<i>Tupsi tupsi muchi</i> BENG, <i>Toposwi</i> HIND <i>Nga-pungna</i> BURM</p>		
<p>Habitat.—The Indian seas Bay of Bengal at least as low as Coconada also along the coasts of Burma to the Malay Archipelago. It enters rivers for spawning purposes during the south west monsoon and the cold months. Though a small fish attaining only 9 inches in length it is much prized as an article of food.</p>		
<p>P tetradactylus, <i>Day Fish Ind 180 Fau Br Ind II 106</i> THE ROWBALL</p>		540
<p>Vern.—<i>Teriya-bhangan</i>, BENG; <i>Polun kala</i> TAM, <i>Yerra kala</i> MADRAS <i>Maga jelli</i> VIZAG <i>To-bro-dah</i> ANDAMANS <i>Pu tha corah</i> MALAY; <i>Ikan salangan sinanghi</i> or <i>salanghi</i> MALAYS</p>		
<p>Habitat.—The seas of India. This is a very large fish 6 feet or more in length indeed Buchanan records a specimen which formed a load for six men. It is excellent eating and is salted on the Madras coast.</p>		
<p>Pristipoma guoraka, <i>Day Fish Ind 75 Fau Br Ind I 512</i> Vern.—<i>Guoraka</i> VIZAG</p>		541
<p>Habitat.—The seas of India said also to have been captured in fresh water. All the species of this genus are fair as food but are not much esteemed the air vessels also are in some places collected for isinglass.</p>		
<p>P hasta <i>Day Fish Ind 73 Fau Br Ind I 510</i> Vern.—<i>Caroua corake</i> TAM <i>U-rug-nud-dah</i> <i>hwr ka to-dah</i> ANDAMANS</p>		542
<p>Habitat.—The seas of India</p>		
<p>P maculatum <i>Day Fish Ind 74 Fau Br Ind I 510</i> Vern.—<i>Curritche</i> TAM <i>Erruttum corah</i> MALAY <i>Caripe</i> TEL; <i>Ur ung dah</i> ANDAMANS</p>		543
<p>Habitat.—Seas of India</p>		
<p>Pristis cuspidatus, <i>Day, Fish Ind 728 Fau Br Ind, I, 37</i> THE SAW FISH</p>		544
<p>Vern.—<i>Yakla</i> VIZAG <i>Ikan-garagaji</i> MALAYS <i>Vela min</i> TAM</p>		
<p>Habitat.—The seas of India ascending rivers. A huge fish attaining 20 feet in length, and of great economic value. The flesh is highly esteemed the fins are prepared for exportation to China, oil is extracted from the livers and the skins are useful for sword scabbards, or for smoothing down wood.</p>		
<p>Psettus argentens, <i>Day, Fish Ind, 235 Fau Br Ind., II 180</i> Vern.—<i>Nga-pus-sind</i> MUOH <i>Uchra-dah</i> ANDAMANS</p>		545
<p>Habitat.—Seas of India. Used as food.</p>		

FISH	Indian Fishes
546	<p><i>Pseudotropius atherinoides</i>, <i>Day, Fish Ind</i>, 473 <i>Fau Br Ind I</i> 141 Vern.—<i>Put-tah-re</i> HIND <i>Battuli bopotassi jemmi carri</i> URIYA; <i>Boh du-ah, pátast, dōyá</i> ASSAM; <i>Put tul chel li</i> PB <i>Ah hi</i> SIND <i>Akku jella</i> TEL; <i>Nga than chyeik</i> BURM Habitat.—Throughout the rivers of India and Assam All the species of this genus are excellent as food but in some localities are to be avoided, as they consume offal</p>
547	<p><i>P. garus</i>, <i>Day Fish Ind</i> 474 <i>Fau Br Ind I</i> 141 Vern.—<i>Buchua</i> HIND <i>Puttosi garua puttosi</i> BENG <i>Puma buchua</i> URIYA <i>Dhon ga nu</i> SIND Habitat.—Found generally throughout the larger rivers of India Assam and Burma</p>
548	<p><i>P. goongwaree</i> <i>Day Fish Ind</i> 471 <i>Fau Br Ind I</i> 137 Vern.—<i>Gúgli gungwarí</i> MAR <i>Nga myen oke-hpa</i> BURM Habitat.—The rivers of Bengal the Deccan and Burma</p>
549	<p><i>P. murus</i>, <i>Day Fish Ind</i> 472 <i>Fau Br Ind I</i> 139 Vern.—<i>Butchua</i> HIND <i>Muri-vacha motusi</i> BENG <i>Muri-vacha</i> URIYA; <i>Ke raad</i> PB <i>Chhotku váchōyá</i>, KUSI Habitat.—The rivers of Sind Bengal Orissa and Assam</p>
550	<p><i>P. taakree</i>, <i>Day, Fish Ind</i> 471 <i>Fau Br Ind I</i> 138 Vern.—<i>Tákrí</i> MAR <i>Salava-jella</i> TEL <i>Nga sin sap nga myin</i> BURM Habitat.—The fresh waters of Puna the Deccan and the rivers Kistna and Jumna This fish attains upwards of a foot in length and is one of the best of the genus as a food</p>
551	<p><i>Pseudorhombus arsius</i>, <i>Day Fish Ind</i> 423 <i>Fau Br Ind II</i> 441 Vern.—<i>Ikan sítlah</i> MALAYS <i>Ky tha thong-dah</i> ANDAMANS Habitat.—Through the seas and estuaries of India Used as food</p>
552	<p><i>Pseudorhynchus balitora</i>, <i>Day Fish Ind</i>, 527 <i>Fau Br Ind I</i> 244 Vern.—<i>Balitora</i> BENG Habitat.—Hill streams and rapids in North east Bengal and Assam Employed as food by Natives</p>
553	<p><i>Pseudoscarnus rivulatus</i>, <i>Day Fish Ind</i> 413 <i>Fau Br Ind, II</i> 426 Vern.—<i>Ar-dah</i> ANDAMANS Habitat.—Seas of India Eaten by Natives of some parts of the coast</p>
554	<p><i>Pterois volitans</i>, <i>Day Fish Ind</i> 154 <i>Fau Br Ind II</i>, 62 Vern.—<i>Parruak</i> MALAY; <i>Kodipungí</i> VIZAG; <i>Chib-ta ta-dah</i> AND Habitat.—Throughout the seas of India. Employed as food in some parts of the country</p>
555	<p><i>Pteroplatea micrura</i>, <i>Day Fish Ind</i> 741 <i>Fau Br Ind I</i> 56 Vern.—<i>Perum tiriki</i> TAM; <i>Tappu cáti</i> TEL; <i>Tenki kunsul</i> VIZAG <i>Lek kyouk temengnee</i> BURM Habitat.—The seas of India Used as food</p>
556	<p><i>Raconda russelliana</i>, <i>Day, Fish Ind</i> 646 <i>Fau Br Ind I</i> 384 Vern.—<i>Potassah fessah phasah</i> BENG Habitat.—The Bay of Bengal, the young are common in the Sunder bans Largely consumed by the native population</p>
557	<p><i>Rasbora buehanani</i>, <i>Day Fish Ind</i> 584, <i>Fau Br Ind, I</i> 337 Vern.—<i>Rasbora</i> BENG Habitat.—The rivers of India Assam and Burma Most common in the valley of the Ganges and along the Coromandel coast Used as food by the Natives</p>
558	<p><i>R. daniconius</i>; <i>Day Fish Ind</i> 584 <i>Fau Br Ind I</i> 336 Vern.—<i>Mile-to-ah</i> HIND; <i>Danikoni, angyaní</i> BENG <i>Jilo dundikerri</i>, URIYA <i>Doh-ni ho-nah</i> ASSAM; <i>Chin-do-iah raan-kaal le chari</i> PB</p>

of Economic Value	(J Murray)	FISH.
<p><i>Ovaricandi purruw-kende</i> TAM <i>Kokanutchi</i> MALAY; <i>Yonir</i>, KUTCH <i>Neddean jubbo</i> KAN <i>Nga-doung sa nga nauch-youn</i> BURM Habitat.—The rivers of India and Ceylon Much more common than R buchanani</p>		
Rhynchobatus ancylostomus , <i>Day Fish Ind 730 Fau Br Ind, I 41</i>		559
<p>THE MUD-SKATE Vern.—<i>Manu ulavi</i> TAM <i>Manu ulava nlladindi</i> TEL Habitat.—Throughout the seas of India The species of the genus are valued like other skates for their skins fins and livers</p>		
R djeddensis , <i>Day Fish Ind 730 Fau Br Ind I 40</i>		560
<p>Vern.—<i>Ulavu tipu ulavu</i> TEL <i>Walawah tenki</i> VIZAG <i>Ranya</i>, MAR Habitat.—Seas of India A large fish attaining 6 feet or more in length the flesh of which is considered nourishing whether eaten salted or fresh and the oil from its liver is much esteemed</p>		
Rhynchobdella aculeata , <i>Day Fish Ind 338 Fau Br Ind, II 331</i>		561
<p>THE SAND OF SPINED EEL Vern.—<i>Bara thuri gutti</i> URIYA <i>Tou-rah</i> ASSAM <i>Aral cul monah</i> <i>aral</i> TAM <i>Bommiday bomri</i> TEL <i>Theluya</i> SING <i>Nga-mawaydoh</i> <i>nya</i> BURM Habitat.—Brackish waters within tidal influence also throughout the deltas of the large rivers of India Burma, and Sind but apparently absent from the northern portions of the Panjáb and Malabar coasts It is excellent as food though objected to by certain classes owing to its resemblance to a snake Buchanan remarks They have less of a dis- gusting appearance than the <i>Muraena</i>, and are more sought after by Natives the highest of whom in Bengal make no scruple in eating them and by Europeans they are esteemed the best of the eel kind It salts well but the flesh is reputed to be slightly heating</p>		
Rita buchanani , <i>Day Fish Ind 454 Fau Br Ind I 165</i>		562
<p>Vern.—<i>Rita</i> BENG <i>Muss ayahri cunta gagah</i> URIYA <i>Gudla jella</i> TEL <i>Nga hitway</i> BURM Habitat.—The Rivers Indus Jumna Ganges and Irrawaddi This fish though a very foul feeder is esteemed as food by the Natives All the species of this genus are employed for food by the lower classes and are valuable from their capability of retaining life long subsequent to their removal from water, owing to which they can be carried fresh for long distances</p>		
R hastata , <i>Day Fish Ind 456 Fau Br Ind I 168</i>		563
<p>Vern.—<i>Kuterni</i> MAR Habitat.—The rivers of the Deccan and Puna, and the Tambudra and Kistna</p>		
R pavimentata , <i>Day Fish Ind 455 Fau Br Ind I 167</i>		564
<p>Vern.—<i>Pilah gokundu</i> HIND <i>Banhi yeddu</i> TEL <i>Gograh khirurh</i> <i>putturhattah</i> MAR Habitat.—Rivers of Puna and the Deccan and affluents of the Kistna</p>		
Rohtee belangeri , <i>Day Fish Ind 587 Fau Br Ind, I 342</i>		565
<p>Vern.—<i>Kilay</i>, TEL <i>Nga hpeh-oung nga net-pya</i> BURM Habitat.—The Godavery river and throughout Burma. Employed as food by the Natives</p>		
R cotio , <i>Day Fish Ind 587 Fau Br Ind, I, 340</i>		566
<p>Vern.—<i>Gurdah chen da-lah, muckni</i> HIND <i>Roti gunia</i> BENG; <i>Gunda gollund</i> URIYA <i>Puttu duh-rie</i> SIND <i>Phenk</i> MAR; <i>Nga</i> <i>hpan-ma</i> BURM Habitat.—Found in rivers ponds and ditches from Sind throughout India (except the Malabar coast and south of the Kistna) and Burma.</p>		

FISH	Indian Fishes
567	<p><i>Rohtee ogilibii</i>, <i>Day Fish Ind</i> 588 <i>Fau Br Ind</i>, I, 342 Vern—<i>Kunninga</i> TEL <i>Rohit</i> MAR Habitat—The Kistna and Godavery, and the rivers of the Deccan</p>
568	<p><i>Saccobranchius fossilis</i>, <i>Day Fish Ind</i> 486 <i>Fau Br Ind</i> I, 125 THE SCORPION FISH Vern—<i>Bitchu ka mutchi singi</i> HIND <i>Singgi singhi</i> BENG <i>Singi</i> <i>URIYA Singi shini</i> ASSAM <i>Lo-har</i> SIND <i>Lahrd</i> (young) nullie (adult) PB <i>Thay li thari</i> TAM <i>Marpu</i> TEL <i>Kahri-min</i> MALAY; <i>Nga gyi nga kyi</i> BURM and MUGH Habitat—The fresh waters of India Ceylon Burma and Cochin China attaining 1 foot or more in length It is considered exceedingly wholesome and invigorating by Natives though in some places deemed impure by the Brahmins In Burma it is salted</p>
569	<p><i>Saurida tumbil</i>, <i>Day Fish Ind</i> 504 <i>Fau Br Ind</i> I 410 Vern—<i>Uluway cul nahmacunda</i> TAM <i>Arranna</i> MALAY; <i>Badimottah</i> VIZAG Habitat—Seas of India Though rather dry and insipid it is consi- derably used as food</p>
570	<p><i>Sciæna bleekeri</i>, <i>Day Fish Ind</i> 185 <i>Fau Br Ind</i> II 112 Vern—<i>Soh li</i> BENG Habitat—Bombay This species is extensively salted at Gwadur</p>
571	<p><i>S coitor</i> <i>Day Fish Ind</i> 187 <i>Fau Br Ind</i> II 115 Vern—<i>Coitor</i> BENG, <i>Botahl putterih</i> URIYA <i>Vella ketcheli</i> TAM <i>Nga ta dun nga-pok thin</i> BURM Habitat—Throughout the larger rivers of India and Burma, descend- ing to the sea at certain seasons</p>
572	<p><i>S cuja</i> <i>Day Fish Ind</i> 187 <i>Fau Br Ind</i> II 115 Vern—<i>Cuja</i> BENG Habitat—The estuaries of the Ganges</p>
573	<p><i>S diacanthus</i>, <i>Day Fish Ind</i> 189 <i>Fau Br Ind</i> II 118 Vern—<i>Chaptis</i> BENG <i>Katcheli nalla katcheli</i> VIZAG <i>Ikan sam-</i> <i>bareh</i> MALAYS Habitat—The seas of India ascending tidal rivers and estuaries It is found in the Hooghly as high as Calcutta</p>
574	<p><i>S maculata</i>, <i>Day Fish Ind</i> 190 <i>Fau Br Ind</i> II 119 Vern—<i>Curuma vari katcheli</i> TAM <i>Cutlah</i> MALAY <i>Sari kullah</i> VIZAG <i>Taantah</i> BEL Habitat—The seas of India It is not considered such a good food fish as the other species</p>
575	<p><i>Scomber microlepidotus</i>, <i>Day Fish Ind</i>, 250 <i>Fau Br Ind</i> II, 203 THE MACKEREL Vern—<i>Karah</i> BENG <i>Karna ksta</i> or <i>karnang kullutan</i> TAM <i>Kana</i> <i>gurta</i> TEL <i>Cunnyla</i> MAD <i>Ila</i> MALAY <i>Kanagurta</i> VIZAG <i>Nga</i> <i>congri</i> MUGH <i>Luk-wa-dah</i> ANDAMANS Habitat—Indian seas A small fish rarely exceeding 10 inches in length very common throughout the cold season in Malabar It is extensively salted and dried but although good eating is seldom brought to the tables of Europeans as it rapidly taints, and if eaten in that condi- tion gives rise to visceral irritation</p>
576	<p><i>Semiplotus mc clellandi</i>, <i>Day, Fish Ind</i>, 550 <i>Fau Br Ind</i> I 281 Vern—<i>Sundari sentori lah-bo-e rajah-mas</i> (= King's fish) ASSAM Habitat—The rivers of Assam especially the upper portions of that district but found as low as Goalpara also in Burma It is asserted that this fish obtained the vernacular name of "king fish" owing to the</p>

of Economic Value	(F Murray)	FISH
<p>fact that in olden times when captured it had always to be taken to the Rajas for their own consumption Day however remarks that as it is very common, this explanation is improbable and it is more likely that it was so named from a tax being levied on its capture Very varying accounts of the value as food of the <i>Semplotus</i> exist McOlelland states that it is the most delicious in Assam while Day records from personal experience that it is rich and liable to set up intestinal irritation</p>		
<p>Serranus diacanthus, <i>Day Fish Ind 17 Fau Br Ind I 449</i></p>		577
<p>Vern.—<i>Damba</i> SIND <i>Chándcha</i> BELUCH <i>Killi min</i> MALAY</p>		
<p>Habitat—Seas of India All the species of this genus of the PERCIDÆ are good as food though coarse when very large A small amount of isinglass also is obtained from their air vessels</p>		
<p>S lanceolatus, <i>Day Fish Ind 18 Fau Br Ind. I 450</i></p>		578
<p>Vern.—<i>Gussir</i> SIND <i>Commari wutla callawah</i> (=Perch with a sore head) TAM <i>Kurrupe</i> MALAY <i>Ikan krapu</i> MALAYS <i>Suggalahtu bontu</i> VIZAG <i>Bole</i> CHITTAGONG <i>Nga towktu shweyda</i> ARRAK</p>		
<p>Habitat—Seas of India and east coast of Africa</p>		
<p>S malabaricus (pautherinus), <i>Day Fish Ind 19 Fau Br Ind, I 451</i></p>		579
<p>Vern.—<i>Punni calawah</i> TAM <i>Bontu madinawah bontu</i> TEL, <i>Bul</i> CHITTAGONG <i>Nga towktu</i> ARRAK <i>Kyouk-theysa kakadit</i> BURM <i>Rab nadah, o-ro-tam dah row je dah</i> ANDAMANS</p>		
<p>Habitat—Seas of India and China</p>		
<p>Sillago sihama <i>Day Fish Ind 265 Fau Br Ind II, 224</i></p>		580
<p>WHITING of Europeans in Madras</p>		
<p>Vern.—<i>Gudji curama</i> URIYA <i>Kulingah kilinyan kinyangan</i> TAM <i>Soring tella soring arriti ki</i> TEL <i>Cudirah</i> MALAY <i>Ngaru</i> MUGH <i>Thol o-dah</i> ANDAMANS</p>		
<p>Habitat—Seas of India ascending tidal rivers Native women who have young babies are advised to eat it as it is said to be even more nourishing than shark's flesh and to have special milk forming properties</p>		
<p>Silundia gangetica, <i>Day Fish Ind 488 Fau Br Ind I 145</i></p>		581
<p>Vern.—<i>Yil lung silond</i> BENG and URIYA <i>Silond</i> PB <i>Wallake-kellette punatti</i> TAM <i>Wangon wanyon</i> TEL <i>Parri, silum</i> MAR</p>		
<p>Habitat—Estuaries of India and Burma ascending high up the larger rivers to nearly their sources It is a large and extremely voracious fish attaining a length of 6 feet or more and is hence called a 'shark' by the natives It is eaten by the poorer classes and its air vessels are collected for isinglass In the Gazetteer of the North Western Provinces it is stated that it is also employed in the manufacture of fish oil for burning</p>		
<p>Sphyræna jello, <i>Day Fish Ind 342 Fau Br Ind, II, 335</i></p>		582
<p>Vern.—<i>Chitahu</i> MALAY <i>Yellow</i> VIZAG <i>Thal ib dah</i> ANDAMANS</p>		
<p>Habitat.—Seas of India A large fish attaining 5 feet or more in length used as food although not much esteemed</p>		
<p>Stromateus cinereus, <i>Day Fish Ind 247 Fau Br Ind II, 198</i></p>		583
<p>SILVER POMFRET (immature) GREY POMFRET (mature)</p>		
<p>Vern.—<i>Vella voval</i> TAM, <i>Sudi sandawa telli-sandawa</i> VIZAG</p>		
<p>Habitat.—The seas of India, attaining one foot or more in length The adult or grey pomfret is considered superior to the immature or silver pomfret for the table and is excellent eating It is also salted along the coasts of India and Burma.</p>		
<p>S niger, <i>Day Fish Ind 247 Fau Br Ind, II, 199</i></p>		584
<p>THE BLACK POMFRET</p>		
<p>Vern.—<i>Baal</i> URIYA <i>Karapú-voval</i> TAM; <i>Nalasandawah</i>, TEL; <i>Karapu-voval</i> MADRAS <i>Nala sandawah</i> VIZAG, <i>Kar-arwili</i> MALAY; <i>Ko-hg dah</i> ANDAMANS; <i>Bawar, bawal tumbah</i>, MALAYS</p>		

FISH.	Indian Fishes
	<p>Habitat—The seas of India, growing to two feet in length. It is excellent eating and is extensively salted though in certain parts the natives dislike it because a species of parasite like a woodlouse is often found in its mouth.</p>
585	<p>Stromateus sinensis, <i>Day Fish Ind 246 Fau Br Ind, II, 197</i> THE WHITE POMFRET Vern—<i>Mogang</i> voval TAM <i>Vella arwāl</i> MALAY <i>Atukoa</i> VIZAG ; <i>Mowe</i> MADRAS <i>Bawal chirmin</i> MALAYS Habitat—Seas of India common in Malabar during the south west monsoon. The young abound round the coasts and ascend estuaries. It is the finest of the genus for eating and should be cooked when quite fresh. Like the other species it is extensively salted wherever it is captured on the coasts of India and Burma.</p>
586	<p>Synaptura orientalis, <i>Day Fish Ind 429 Fau Br Ind II 440</i> Vern—<i>Sappati</i> MALAY Habitat—Sind Western coast of India, Andamans, and the China seas. Used as food.</p>
587	<p>Teuthis concatenata, <i>Day Fish Ind 167 Fau Br Ind II 90</i> Vern—<i>Thar oar dah</i> ANDAMANS Habitat—The Andaman and Malayan seas. All the species of this genus enumerated below are eaten by Natives.</p>
588	<p>T java, <i>Day Fish Ind 165 Fau Br Ind II 88</i> Vern—<i>Ottah</i> TAM <i>Worahwah</i> TEL <i>Thar oar dah</i> ANDAMANS Habitat—The seas of India.</p>
589	<p>T vermiculata, <i>Day Fish Ind 166 Fau Br Ind, II 88</i> Vern—<i>Kut-e rah</i> MALAY <i>Chow-lud-dah</i> ANDAMANS Habitat—The seas of India.</p>
590	<p>T virgata, <i>Day Fish Ind 166 Fau Br Ind II 89</i> Vern—<i>Tah mir dah</i> ANDAMANS Habitat—The Andaman and Malayan seas.</p>
591	<p>Toxotes jaculator, <i>Day Fish Ind 117 Fau Br Ind II 23</i> Vern—<i>Cha ra wud-dah</i> ANDAMANS <i>Ikan sumpit</i> MALAYS Habitat—Seas of India. Used as food.</p>
592	<p>Trachynotus ovatus, <i>Day Fish Ind 234 Fau Br Ind II, 179</i> Vern—<i>Kutū</i> TAM <i>Mukali-parah</i> VIZAG Habitat—Seas of India. This fish salts well but when fresh is dry and insipid.</p>
593	<p>Trichiurus haumela, <i>Day Fish Ind 201 Fau Br Ind, II 134</i> Vern—<i>Puttiah</i> URIYA <i>Sona ka wahlah</i> TAM <i>Sawala</i> TEL <i>Wale</i> MADRAS <i>Pa-pa-dah</i> ANDAMANS <i>Ikan puchuk</i> MALAYS Habitat—Seas and estuaries of India. All three species of this genus are employed for food but are held in various estimation in different places. In Baluchistan and where salt is cheap no one will touch them but along the coasts of India where the salt tax has ruined the fish-curer's trade they are more esteemed mostly because being thin and ribbon shaped they can be dried without salting. Russell observed that in his time they were esteemed by European soldiers, and Jerdon states that they afford very delicate eating when fresh though never brought to the table of Europeans (<i>Day</i>).</p>
594	<p>T muticus, <i>Day Fish Ind, 200 Fau Br Ind, II, 134</i> Vern—? Habitat.—Seas of India, very common in Orissa.</p>

of Economic Value.	(J Murray)	FISH.
Trichiurus savala , <i>Day Fish Ind.</i> , 201 <i>Fau Br Ind</i> , II 135 Vern.— <i>Droga-puttiak</i> , URIYA; <i>Sa-vale</i> , MADRAS Habitat.—The seas and estuaries of India		595
Trichogaster fasciatus , <i>Day Fish Ind</i> 374 <i>Fau Br Ind</i> II, 372 Vern.— <i>Kolisha</i> BENG <i>Kussuah colia</i> URIYA <i>Koh li hona</i> , ASSAM; <i>Kun-gi</i> PB <i>Pich-ru</i> SIND <i>Ponundi</i> TEL <i>Nga pin thick houk</i> <i>nga phyin thaleb</i> BURM		596
Habitat.—Fresh waters of the Panjáb North Western Provinces Sind Cachar Assam the Coromandel coast as far south as the river Kistna, and the estuaries of the Ganges and Burma It is extensively dried in various parts of the country and in Burma is made into <i>nga-pé</i>		
Trygon sephen , <i>Day Fish Ind</i> 740 <i>Fau Br Ind</i> I 50 Vern.— <i>Adavalan tiriki</i> TAM, <i>Volugari tenki</i> TEL; <i>Wolga tenki</i> VIZAG		597
Habitat.—Through the seas of India growing to a large size Wounds inflicted by the spine of its tail are considered dangerous All the species are valuable on account of their skins from which shagreen may be prepar- ed or which may be employed for sand paper their fins which are ex- ported to China and their livers from which oil is extracted		
T uarnak , <i>Day Fish Ind</i> 737 <i>Fau Br Ind</i> I 53 RAY Eng Vern.— <i>Sankush</i> URIYA <i>Sona kah tiriki</i> TAM <i>Puli tenke</i> TEL		598
Habitat.—Seas and estuaries of India attaining a large size—5 feet or more across the disk As in the former species the caudal spines are capable of inflicting severe wounds In addition to possessing the pro- perties detailed under T sephen , this species is of value as food, and is dried in several places along the coasts		
Umbrina russellii <i>Day Fish Ind</i> 183 <i>Fau Br Ind</i> II, 110 Vern.— <i>Qualar katcheli</i> MAD <i>Ikan gulama</i> MALAYS		599
Habitat.—Seas of India The best food fish of the genus though like other <i>SCIENIDÆ</i> its flesh is rather tasteless when young and coarse when large The sounds or air vessels are a valuable source of isinglass		
Upeneoides vittatus , <i>Day Fish Ind</i> 120 <i>Fau Br Ind</i> II, 25 MULLET, Eng Vern.— <i>Chirul</i> MALAY <i>Bandi gúlvinda</i> VIZAG; <i>Chah-ti ing ud dah</i> AND		600
Habitat.—Red Sea and the seas of India Like many other species of the family <i>MULLIDÆ</i> the flesh of this fish is most excellent eating		
Wallago attu , <i>Day Fish Ind</i> 479 <i>Fau Br Ind</i> I 126 Vern.— <i>Boyari</i> BENG <i>Boali ballia moinsia ballia</i> URIYA <i>Mulla</i> <i>pi ki jer ki</i> SIND <i>Purram worshurah</i> MAR <i>Wahlak tele</i> TAM <i>Wallagu walaga</i> TEL <i>Wahlak</i> MALAY <i>Nga batt</i> BURM		601
Habitat.—Through out the fresh waters of India Ceylon and Burma It attains at least 6 feet in length and though a voracious and not very cleanly feeder is good eating		
Zygena malleus , <i>Day Fish Ind</i> 719 <i>Fau Br Ind</i> I, 22 HAMMER HEADED SHARK Eng Vern.— <i>Koma sorra</i> TEL <i>Nga-man thanwoot</i> BURM		602
Habitat.—Tropical and temperate seas of India The adult fish is a large and extremely dangerous one but the young are captured along the shores in large numbers on account of their flesh, which is sup- posed by the poorer classes to be very nourishing, of the oil which is ob- tained from their livers of their gelatinous fins, and of the skin, which is used for the manufacture of shagreen		

FLACOURTIA
montana.**The Many-spined Flacourtia.****FLACOURTIA, Comm Gen., Pl I, 128**

A genus of trees or shrubs often spinous containing about twelve species, natives of the Old World of which some are cultivated in tropical countries. There are eight Indian species of which five are of economic interest.

603

Flacourtia Cataphracta, Roxb Fl Br Ind, I, 193

MANY SPINED FLACOURTIA, Eng PRUNNIE D INDE Fr

Vern.—*Talispatri*, *panimalak* *pani-onvola* HIND ; *Pamidá*, BENG
Jan gama támbath jaggam BOMB *Tambat* MAR *Tálistpátra* GU7
Tálistapatri TAM *Talisapatri*, TEL *Naydwid* BURM *Práchinama*
laka talisha SANS *Zarnab* ARAB ; *Talis-patar* PERS

References—*Roxb Fl Ind Ed C B C* 739 *Kurs For Fl Burm* 74
Gamble Man Timb 17 *Pharm Ind* 27 *Ainslie Mat Ind II* 407
O Shaughnessy Beng Dispens 9 *Dymock, Mat Med W Ind* 2nd
Ed 74, *Pharmacographia Indica I* 152, *Irvine Mat Med Patna*
87 Lisboa U Pl Bom 7 146 277 *Birdwood, Bom Pr* 8, *Balfour*
Cyclop I 1126, *Journ As Soc* 1867 80 II 2 *Home Dept Cor*,
239 *Journ Agri Hort Soc XII* 345

Habitat—A small tree of Assam Bengal Burma Bombay, and the Western Gháts Commonly cultivated in India

Oil—The SEEDS yield an oil of which little is known but further information regarding it might lead to the opening up of a trade in an article which even the poorest cultivator might supply from the wild plant

Medicine—The LEAVES and YOUNG SHOOTS taste like rhubarb and are supposed to possess astringent and stomachic properties They are prescribed in diarrhoea weakness and consumption An infusion of the BARK is also given for hoarseness The FRUIT is said by Dymock to be recommended as useful in bilious conditions

Compare with *Abies Webbiana*

SPECIAL OPINIONS—\$ The leaves are said to have diaphoretic properties (*Deputy Sanitary Commr Joseph Parker M D, Poona*)

Used as a powder in chronic bronchitis (*Surgeon Major J J L. Ratton M D Salem*) Sold in Mysore bazars and used in combination with other drugs for cough &c (*Surgeon Major John North Bangalore*)

Under the name *Talispatri* are sold in the bazar the leaves of a pine (*Abies Webbiana*) (*Asst Surgeon Sakharum Arjun Ravut L M, Gorgaum Bombay*) *Talispatri* is probably this plant and not *Abies*—*Ed*

Food—Taylor in his Topography of Dacca writes The FRUIT of this tree which is of a purple colour and of the size and appearance of a plum is sold in the city during the rains Dr Watson reports that the fruit is eaten in Allahabad It is also generally used as an article of food in Assam

Structure of the Wood—Heavy brown close-grained rather hard and brittle and takes a fine polish (*Kurs For Fl Burma*)

F inermis, Roxb ; Fl Br Ind I 193

Vern—*Tomi tomi*; MAL (SP) *Tambat jaggam* BOMB *Ubbolu* KAN

References—*Roxb Fl Ind, Ed C B C* 739 *Kurs For Fl Burm* 74
Gamble Man Timb 17 *Lisboa U Pl Bom* 7 146

Habitat—A middling sized tree probably introduced from the Moluccas At present found in Sylhet South India and Martaban It blossoms during the dry season and ripens its fruit towards the close of the rains

Food—The FRUIT says Roxburgh, is too sour to be eaten raw but makes very good tarts In the Moluccas, however it is eaten

F montana, Grah, Fl Br Ind, I, 192

Vern—*Attak-ke-jar attak* BOMB *Champer* MAR, *Hannu sampige*, KAN

Habitat—A very thorny tree found in Kanara and the Concan

Food—"The FRUIT—used as a fruit" (*Birdwood Bom Products*)

F 614

OIL
Seeds
604
MEDICINE
Leaves
605
Shoots
606
Bark
607
Fruit
608

FOOD
Fruit
609

TIMBER
610

611

FOOD
Fruit.
612
613
FOOD
Fruit.
614

Flacourtia Timber

(F Murray) FLAME TREES

Flacourtia Ramontchi, L Herit, Fl Br Ind, I, 193

Syn — F SAPIDA Roxb

Vern — *Bilangra* bhanber kanyé hands kattár katti kundayi bunj bowchi HIND *Bincha katás támbat* BENG *Katail* PALAMOW; *Serali merlec sarlarkha* KOL *Merlee* SANTAL *Bonicha basli baincho* URIYA *Arma suri katién*, GOND; *kákai hakoa hangé handei kukoa* PB; *Bhutankas bógaché* SIND *Kánk kánk bilati* C P *Swadu kan taka, támbat kashun pahar bhekal kahad* BOMB; *Kundayee bunj bowchee* DEC *Pahar bhekal kaker kaker aturni* MAR; *Kashun* MHAIRWARA *Gurgoti* KURKU *Kanregu p dda kanru kaka nakha naregu* TEL *Na-yuwaí* BURM *Ugurassa* SING

References — Roxb *Fl Ind Ed C B C* 739 *Brands For Fl* 18 *Kurs For Fl Burm* 75 *Gamble Man Timb* 17; *Stewart Pb Pl* 18 *Rev A Campbell Rep on Ec Prod Chutia Nagpur No 8441* Lisboa *U Pl Bomb* 6 146 277 *Birdwood Bomb Pr* 7 *For Adm Report, Chutia Nagpur* 1885 28 *Raj Gas* 27

Habitat — A small thorny deciduous tree met with in dry hills throughout India and the Prome District of Burma

Medicine — Native inoculators in the Panjáb use the THORNS for breaking the pustule of small pox on the 9th or the 10th day After child birth among natives in the Deccan the SEEDS are ground to a powder with turmeric and rubbed all over the body to prevent rheumatic pains from exposure to damp winds The GUM is given along with other ingredients for cholera The BARK is applied to the body along with that of *Albizia* at intervals of a day or so during intermittent fever in Chutia Nagpur

SPECIAL OPINIONS — § According to Sanskrit writers the FRUITS are sweet appetising and digestive They are given in jaundice and enlarged spleen' (*U C Dutt Civil Medical Officer Serampore*)

Food and Fodder — The FRUIT and the LEAVES are eaten The former is of the size of the plum has a sharp but sweetish taste and is used either raw or cooked The leaves are employed as cattle fodder

Structure of the Wood — Red hard close and even grained splits but does not warp and is durable Weight about 53lb Is used for turning and agricultural implements

F sepiaria, Roxb, Fl Br Ind, I 194

Vern — *Kondai* HIND *Sherawane sargal daykar judkar khatá kingro* PB *Bainch* CP *Atruna támbat* BOMB *Kanru kána régu*, TEL

References — Roxb *Fl Ind Ed C B C* 739 *Kurs For Fl Burm* 1 75 *Gamble Man Timb* 17 *Stewart Pb Pl* 18 *Lisboa U Pl Bomb* 146 277; *Kew Off Guide to Bot Gardens and Arboretum* 68

Habitat — A small stiff spiny shrub found in dry jungles throughout Bengal the Western Peninsula and Ceylon It also occurs about Delhi in the Salt Range and on the skirts of the Sulimans Is extensively employed for making hedges

Medicine — An infusion of the LEAVES and ROOTS is supposed to be an antidote to snake-bite The BARK triturated in sesamum oil is used as a liniment in rheumatism (*Wight Ainslie Rheede*)

Food — The FRUIT is said to be eaten by the natives of the Panjáb tracts where it is found but it is small hard and insipid it is however sometimes described as 'pleasant refreshing, and sub-acid' The LEAVES are thrashed out for cattle fodder

FLAME TREES

Different trees, having brilliant flowers which in most cases appear before the leaves when seen at a distance, they have the appearance of

615

MEDICINE

Thorns

616

Seeds

617

Gum

618

Bark

619

Fruits.

620

FOOD

Fruit.

621

Leaves.

622

TIMBER

623

624

MEDICINE.

Leaves

625

Roots.

626

Bark.

627

FOOD

Fruit

628

Leaves.

629

630

FLEMINGIA
congesta

Flame Trees Waras Dye.

being on fire—hence the popular name Flame Trees The principal trees of this nature are —

Amherstia nobilis

Bombax malabaricum —Silk Cotton Tree

Butea frondosa and *superba*.—Tésu Flowers

Cassalpinia pulcherrima —Barbadoes Pride or Gold Mohur Tree
(a corruption of the Hind name *Gulmor* or Peacock Flower)

Cochlospermum Gossypium —White Silk Cotton Tree

Lagerstroemia Flos Regiæ

Poinciana regia.—The Mascarene

Pterospermum acerifolium

Rhododendron arboreum &c, &c

Flax, Common, see *Linum usitatissimum* Linn LINEÆ.

631 **Flax (New Zealand)** The fibre of *Phormium tenax*.

632 **Flea-bane**

A powder made of the dried flowers or seeds of several species of plants for the destruction of, or rather driving away of fleas

In Persia the flowers of three species of *Pyrethrum* are employed In India the flea bane commonly used is the *Purple Flea bane* or seed of *Veronia anthelmintica* (Willd) See *Pyrethrum* and *Veronia*.

Fleece of Sheep, see *Skins*

(G Watt)

FLEMINGIA, Roxb Gen Pl I 544

633 **Flemingia congesta**, Roxb Fl Br Ind II 228 Wight Ic t 390, [LEGUMINOSÆ

Vern —*Bara salpan bhahia supta cusunt* HIND *Bara salpan bhahia*
BENG *Buru ekasira nari bir but SANTAL*, *Batwas* NEPAL *Mipit muk*
LEPCHA *Dangshukop* MICHI *Dowdowld* BOMB and MAR
Tha kya nav BURM

References —Roxb Fl Ind Ed C B C 572 Gamble List of Trees
Shrubs &c of Darjeeling 28 Dals & Gibs Bomb Fl 75 Rev A
Campbell's Report on Econ Prod Chutia Nagpur No 8465 Atkinson,
Econ Prod N W P Pt V, 94 Kew Reports 1881 50 Kew Off Guide
to the Mus of Ec Bot 45 Report Bot Gardens Nilgiri 1883 84 10

Habitat —An erect woody shrub common in the thickets and forests of the warmer parts of India

The *Flora of British India* reduces to this species the following forms described by Roxburgh as distinct (see Ed C B C pp 571 72) —

F procumbens *F prostrata*, *F nana*, *F congesta* and *F semialata*, forming four varieties —

634 *Var 1—semialata* (sp Roxb syn *F stricta*, Wall *F prostrata*,
Roxb)—Central Himálaya ascending to 5 000 feet in altitude

635 *Var 2—latifolia* (sp Benth)—Khasia Hills altitude 2 000 to 3,000 feet

636 *Var 3—Wightiana* (sp Grah)—Nilghiris Bhutan Ava

637 *Var 4—nana* (syn *F procumbens* Roxb *F capitata*, Ham)—Central
and Eastern Himálaya and the Concan

HISTORY

638

Modern Commercial History of Waras Dye —In a correspondence forwarded by the Secretary of State for India to the Revenue and Agricultural Department Sir J D Hooker communicated certain facts regarding the *waras* drug and dye of Africa which led to the suggestion that that substance was obtained from a *Flemingia* and probably one of the forms of the common Indian species *F congesta*. Roxburgh nearly a century before had drawn attention to the garnet coloured hairs on the pods of

F. 638

The Waras Dye

(G Watt)

**FLEMINGIA
congesta.****HISTORY**

that plant but was apparently ignorant of the fact that these yielded a valuable dye. In the Kew Report for 1881 further information was published regarding *waras* and it was there suggested that it was in reality obtained from the African species *F rhodocarpa*. The Director of Kew however suggested to Mr M A Lawson Botanist to the Madras Government that he should ascertain if the pods of the Indian species yielded the dye. This resulted in Mr Lawson procuring a sample of the powder which was sent to Kew and ultimately tested by Mr Wardle of Leck. About the time these experiments were being performed Major F M Hunter of Aden forwarded to Kew a report which threw still further light on the subject. The specimens furnished by Major Hunter led to Mr W T Thiselton Dyer's writing. There can be now no sort of doubt that the *waras* plant is really that described by Mr J G Baker FRS in the Flora of Tropical Africa as *Flemingia rhodocarpa*. But my colleague Professor Oliver FRS whose kindness is only equalled by his sagacity has made the curious discovery that a *Flemingia* apparently confined to South India *F Grahamiana*, *W & A* is not specifically distinguishable from *F rhodocarpa*, the pods are in fact clothed with the same peculiar epidermal glands so characteristic of that species. The *waras* plant is therefore really to be found in India after all. In creating a new species for the *waras* plant Mr J G Baker pardonably neglected the comparison of the material he was working upon with specimens of the species occurring in so remote and botanically widely severed an area as the southern part of the Indian peninsula. (*Four Pharm Soc May 31st 1884*) Shortly before the date of appearance of the above passage Mr Lawson in his Annual Report for 1883-84 while dealing with his efforts to procure a sample of *waras* from an Indian *Flemingia* wrote. From specimens which I sent to Kew *waras* turns out to be the produce of *Flemingia Grahamiana* and *F congesta*. With respect to the distinctive characters of these two species I pointed out that after studying the plants in their living condition I did not think them sufficiently constant to allow of the two species being kept separate and in this opinion both Mr Thiselton Dyer and Professor Oliver now concur. If this position be confirmed by future research then apparently both *F rhodocarpa* and *F Grahamiana* would have to be referred along with *F congesta*, to forms of one species. It is on the probability of such a rearrangement and as a matter of economy of space that the writer has thrown the present account of the African *waras* into one place and under one species instead of attempting to discuss it under several.

Dye—Mr Lawson wrote of his experiments with the Indian powder procured by him from *F Grahamiana* and *F congesta*. 'The *waras* yields a beautiful dye when applied to animal substances such as silk or wool but it is inferior as a dye when used for the purpose of colouring vegetable products such as cotton or linen. Mr Thiselton Dyer has kindly obtained for me a London expert's opinion upon the value of *waras* and I regret to say that it is not such as is likely to lead one to believe that it will ever become an object of commercial interest. I may mention that when I was in Madras last winter I saw at the Agri Horticultural Gardens flower show a specimen of *waras* in a native dyer's collection which was being exhibited, and from which it would appear that *waras* is not unknown as a dye in India.' It would be interesting to know if the sample alluded to by Mr Lawson was critically examined so as to remove any doubt as to its being in reality *waras* and not *kamila* (see *Mallotus philippinensis*). One other notice occurs however regarding an Indian knowledge of the dye property of the *Flemingias*. The Rev A. Campbell in his Report on the Economic Products of Chutia Nagpur,

**DYE.
639**

**FLEMINGIA
congesta****The Waras Dye.****DYE**

writes of *F congesta* "The pods are said to yield a dye ' It would thus appear that the Santals are familiar with the dye and as Mr Oampbell does not call this *waras* there is no room for doubting but that he alludes to a fact the interest of which beyond the limits of his own province Mr Oampbell was in all probability not aware of

It may serve a useful purpose to reproduce here Major Hunter's description of the collection and purification of the dye as pursued in Africa at Harrar —

In the neighbourhood of the city 'wars' is not now raised from seed sown artificially and it is left to nature to propagate the shrub in the surrounding terraced gardens The plant springs up among jowari coffee &c in bushes scattered about at intervals of several yards more or less When sown as among the Gallas it is planted before the rains in March If the soil be fairly good a bush bears in about a year After the berries [pods] have been plucked the shrub is cut down to within six inches of the ground It springs up again after rain and bears a second time in about six months and this process is repeated every second year until the tree dies Rain destroys the berry [pod] for commercial purposes it is therefore only gathered in the dry season ending about the middle of March The bush grows to a maximum height of six feet and it branches close to the ground The growth is open and the foliage sparse Each owner has a few acres of land

In the middle of February 1884 the following processes were observed —

The leaves [? fruiting shoots] of some plants were plucked and allowed to dry in the sun for three or four days (The picking is not done carefully and a considerable quantity of the surrounding twigs &c is mixed with the berries [pods]) The collected mass was placed on a skin heaped up to about six or eight inches high and was tapped gently with a short stick about half an inch thick After some time the pods were denuded of their outer covering of red powder which fell through the mass on to the skin The upper portion of the heap was then cleared away and the residual reddish green powder was placed in a flat woven grass dish with a sloping rim of about an inch high This receptacle was agitated gently and occasionally tapped with the fingers the result being the subsidence of the red powder and the rising to the surface of the chaffy refuse which latter was carefully worked aside to the edge of the dish and then removed by hand This winnowing was continued until little remained but red powder (No great pains are even taken to eliminate *all* foreign matter) A *rotl* was sold in 1884 for about 13 piastres=1 rupee 10 as nearly

War is sent to Arabia chiefly to Yemen and Hadhramaut where it is used as a dye a cosmetic and a specific against cold In order to use it a small portion of the powder is placed in one palm and moistened with water the hands are then rubbed smartly together producing a lather of a bright gamboge colour which is applied as required" (*W T Thiselton Dyer Pharm Jour May 31 1884*)

Mr Wardle regards *waras* as a distinctly inferior dye to *kamala* (*Mallotus philippinensis*) The latter has been exported from India to Europe for many years past as an adulterant or substitute for the former Mr Wardle writes of *waras* This substance contains only a small amount of colouring matter compared with the vegetable yellow dyes of commerce, and no colour can be obtained from it which will bear comparison in depth and richness with those produced from *kamala* or *kapila*, for which as stated in the Kew Report for 1880, it is used as a substitute, and which is certainly a very much more valuable dye stuff

The Waras Dye.

(G Watt)

FLEMINGIA
vestita.

"As far as my observations have gone *waras* is inferior to *kamāla* in permanence as regards the action of light. The colour produced with *waras* is easily turned brown by alkaline solutions whilst *kamāla* is only slightly reddened. Both dyes, however resist the action of acids very well. I corroborate the statement made by Professor Lawson that *waras* is suitable for a dye for silk rather than for wool and that it is quite useless as a dye for cotton. I have tried it on cotton with most of my mordants as well as without mordants, and the result is a pale-yellow shade.

In Bombay the word *waras* (as a pure coincidence probably) is given to a Bignoniaceous plant—*Heterophragma Roxburghii*,—but a far more likely error would be to mistake *kamāla* for *waras*. That substance is alluded to by some of the early Arabic writers its Sanskrit name being corrupted into *kinbāl*. The author of *Kāmus* who wrote A. H. 768 notices both *kinbāl* and *waras* but treats them as distinct substances. The latter he says is only found in Arabia, and it does not possess the anthelmintic properties of the former. So again the *Makhsan* distinguishes the two plants the one being the pulp as it is called from the fruits of a tree, while the other is obtained from the pod of a pea like *māsh* (*Phaseolus*) (*Dymock*). It would thus appear clear that from whatever cause has proceeded the confusion which till recently existed in modern literature the early writers fully understood the properties and sources of the two plants—*kamāla* and *waras*.

(For further information consult the account of *Mallotus philippinensis*.)

Medicine—The POWDER from the PODS constitutes the African drug *waras* or *wars*. This does not appear to be employed in India though much of the obscurity into which the anthelmintic drug *kamāla* has been thrown is doubtless due to *waras* having been substituted. The ROOTS of *Flemingia congesta* the Rev Mr Oampbell informs us are used by the Santals as an external applicant to ulcers and swellings mainly of the neck.

Food—According to Atkinson (*Econ Prod N W P*, V 94) the PODS are eaten. Mr Oampbell says that the Santals also eat them.

Flemingia Grahamiana, W & A Fl Br Ind, II, 228

This Nilghiri plant according to Mr Baker's account of it in the *Flora of British India* differs from *F congesta* mainly in the leaflets being longer more obtuse and borne on shorter petioles and in the rigid subsistent bracts. Mr Lawson in the passage quoted above regards this species however as doubtfully distinct. It is probable that whether it be regarded as a species or only as a variety this plant yields the *waras* powder more freely than other known Indian forms.

Several species of *Flemingia* are occasionally mentioned by authors on Indian Economic Botany but none of them (except *F vestita*) seem of sufficient merit to deserve separate notice in this work. It is somewhat remarkable that practically none of these Leguminous plants are recorded as being eaten by cattle, sheep or goats.

F Strobilifera, R & M

Is repeatedly mentioned for its medicinal properties. It is the *sum busak* of the Santals the roots of which the Rev A Oampbell informs us are sometimes given in epilepsy. It is the *Bolu* of the Darjeeling hill tribes and the *Pha tán phyu* of Pegu. In the Central Provinces buffaloes are said to eat this species.

F vestita, Benih Fl Br Ind II, 230

A small creeping plant with dark brick red flowers which appear in July to August. This is said to be cultivated in some parts of North West India for the sake of its edible tuberous roots which are nearly

DYE.

MEDICINE
Powder

640

Roots

641

FOOD
Pods.

642

643

644
MEDICINE.

645

FODDER

646

647

FOOD

648

FLUOR-SPAR

Animal Flesh Flint Fluor-spar

elliptical and about an inch long' (*Lindley and Moore's Treasury*) The writer has never seen it cultivated nor can he discover any Indian author who alludes to this fact but around Simla the plant is very plentiful and along with *Vigna vexillata*—the *guldí* or *ban* (wild) *mung* of the N W Himálaya—the roots are regularly collected and eaten especially by herd boys attending on cattle They have a sweet agreeable nutty flavour and if systematically cultivated might come to afford a useful new vegetable somewhat of the character of the Jerusalem Artichoke The Himálayan form has few flowers much less crowded than in the variety described as *nulgheriensis*, *Wight l c t 987*

(*F Murray*)

649

FLESH, Animal

In India the flesh of animals is not only used as a food but from very early times has been much employed medicinally by native practitioners both internally as *ghritas* and externally as *taila paka*

FOOD
650

Food—Sanskrit writers describe the different properties of the flesh of various animals in great detail By them the flesh of the goat domestic fowl peacock and partridge is said to be easily digested and suited for the sick and convalescent the meat of the deer sambar hare quail and partridge is recommended for habitual use while beef and pork are viewed as hard to digest and unsuited for daily use

MEDICINE
651

Medicine—Medicinally the goose fowl jackal goat snail and mun goose are principally employed their flesh being prescribed for many forms of disease but chiefly those of the nervous system

The *ghrita* and the *taila paka* into which they are compounded contain in addition a great variety of vegetable drugs (*U C Dutt Hind Mat Med p 286*)

652

FLINT

Vern—*Chakmak HIND*; *Chakimukhí TAM TEL*

Flint is a massive compact form of almost pure silica and is generally of a dark brownish colour It breaks with a conchoidal surface and forms sharp cutting edges True flints are of rare occurrence in India but in the manufacture of implements in prehistoric times horses bones agates &c were substituted and some of these form efficient gun flints or flints for flint and steel

Flints are said to be found at Coorchycolum in the Trichinopoly district of Madras (*Manual of the Trichinopoly District p 67*) in the Dharwar district of Bombay (*Madras Jour of Lit and Sci Vol XI p 46*) in the Bannu district of the Panjáb (*Baden Powell's Pb Prod p 46*) and in Afghánistan immediately across the Kurram (*Records G S I XII p 111*)

Owing to the extensive use of the chalcidonic quartzes in place of the true flint it is difficult to decide whether the mineral reported to be found in the above situations is real flint or not

USES
653

Uses of—Flint when calcined and ground is used in the manufacture of pottery and in the natural condition for gun flints

Flour, see *Triticum sativum*, *Lamk* and *Oryza sativa*, *Linn* GRAMINEÆ

Flower Fence, see *Cæsalpinia pulcherrima*, *Swartz* Vol II, 10

Flower oil, see *Sesamum indicum*, *D C* PEDALINEÆ

654

FLUOR-SPAR

Derbyshire Spar—This mineral consists of calcic fluoride Found in India only in very small quantities probably owing to the small number of metal mines at present worked

F 654

Flying-fox Fennel

(J Murray)

**FENICULUM
vulgare**

It has been recorded as found at Chicholi in the Raipur district of the Central Provinces (*Rec G S I Vol I 37*) in the Rewah State (*Mem G S I VII 122*) and at Spiti in the Panjab (*Mem, G S I V 166*)

Uses of—Are few principally employed in the preparation of hydrofluoric acid for the etching of glass and for making a flux sometimes used in the reduction of the ores of copper and other metals

Fluoride of calcium, see Fluor-spar

FLYING-FOX

655

Flying fox is the name given by Europeans in India to several species of BATS constituting the genera *Pteropus* and *Cynopterus*. Those commonly found in this country are *Pteropus medius*, Tem the large flying fox and *Cynopterus marginatus*, the small flying fox but *C. affinis* and *P. minimus* are also natives of India

The habits of the whole family are very similar and as they are in differently termed Flying fox and the vernacular names for all seem the same they may be described collectively

Vern—*Gadal chamgudar* HIND; *Cham-guddri chidgu* BENG; *Kanka pati* KAN *Gabbday jiburai* TEL

Reference—*Jerdon's Mam of Ind 18*

Habitat.—Common bats found throughout India Burma and Ceylon. They roost in large colonies in trees during the day often numbering two or three hundred on a single tree—generally the *pipal* (*Ficus religiosa*) at night they roam over the district doing incalculable harm to fruit trees

Food—The natives of Bengal catch this animal in the following manner—A string is tied to the very topmost branch of a tree likely to be visited during the night while a man sits below holding the string. A bat coming in contact with the string closes its wings around it in order to save itself from falling. The man then jerks the string sharply and the bat glides down into his hands

The trees usually selected for this operation are the favourite avenue tree *Polyalthia longifolia* (the nuts of which form a favourite food of the flying fox) and *Terminalia Catappa*

The flesh of these bats is eaten by the lower class Bengalis also by the natives of Madras

Medicine—The FLESH is recommended by native practitioners in cases of diabetes and when muscular energy is deficient. The FAT boiled down is a favourite remedy in rheumatism of the joints

FOOD
656MEDICINE
Flesh
657
Fat
658**FENICULUM**, *Adans*; *Gen Pl I, 902*

A genus of glabrous herbs belonging to the Natural Order Umbelliferae having 3 or 4 species which are widely distributed from the Canaries to Western Asia. *F. vulgare* is extensively cultivated

Fœniculum vulgare, *Gärtn Fl Br Ind, II 695 Bentley & Trim, Med Pl, No 123, Wight Ic t 570*; **UMBELLIFERÆ**
THE FENNEL

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Syn.—**FENICULUM PANMORIUM** DC. *Wight Ic F OFFICINALE*, *Allison*
ANETHUM FENICULUM Linn. **A PANMORIUM** Roxb. **F CAPIT**
LACEUM Gilib. *Bentley & Trim F DULCE C Bauh* **OZODIA**
FENICULACEA W & A Prodr

Vern.—*Saunf bari saunf sonb sont* HIND, *Mauri pan-muhori* BENG; *Bari-shophā panmohuri* BOMB *Variari variaree variyah*, GUZ *Badishep* MAR; *Badisopu* KAN *Aspa badyan* TURKI; *Sohikre*, TAM *Pedda-jula kurra* TEL *Madhūrikā* SANS

References—*Roxb, Fl Ind Bd C B C 272 Stewart Pb Pl 107*; *Ainslie, Mat Ind I 129 O'Shaughnessy Beng Dispens 36 U C*

F 659

**FENICULUM
vulgare****Fennel.**

Dutt Mat Med Hind, 173 *Dymock Mat Med W Ind and Ed* 372
S Arjun Bomb Drugs 64 *Murray, Pl and Drugs Sind*, 197; *Irvine*
Mat Med Patna 88 *Atkinson Him Dist* 705 737, *Lisboa U Pl*
Bomb 161; *Birdwood Bomb Pr* 41 665; *Home Dept Cor*, 231

Habitat—This perennial attains a height of 5 to 6 feet and is commonly cultivated throughout India at all altitudes up to 6000 feet but is sometimes also found wild. Several cultivated races seem to grow in India but these do not appear to have been botanically recognised. The seed is smaller and straighter than that of the European fennel but is otherwise similar.

**CULTIVA
TION
660**

Cultivation—This plant seems in India generally to be grown only in small patches in homestead lands as a cold weather crop. The method of cultivation is that of an ordinary market garden crop. In Bombay however it appears to be cultivated to a larger extent. The following account has been received from the Director of Land Records and Agriculture dated September 1889—"In 1887-88 Fennel occupied 1,454 acres of which 834 acres were in Khándesh. It is grown in some districts of Gujarat and the Deccan. In the former district it is grown in *gorat* light soil moderately manured—10 cart loads to the acre. The land is ploughed harrowed and rolled three times between June and October. About 9lb of seed per acre are scattered by hand into beds which are irrigated once a fortnight until January. The crop is cut in rather a green state and allowed to lie in the ground for five days. The acre yield varies from 280 to 1120lb—720lb being a good average crop. In the gardens in the Deccan it is sown at any time. It is also sown on the edges of dry crops in July and August. The probable total yearly outturn is estimated at 13000 maunds, and the price realised varies from R6 to R8 per Indian maund.

**CHEMISTRY
661**

Chemistry—Fennel fruit yields about 3 per cent of volatile oil anethol or anise camphor and a variable proportion of a liquid isomeric with turpentine. Anethol (the constituent important medicinally and as a flavouring agent) may be obtained either as a liquid or crystal as it takes the latter form at a moderately low temperature (*Pharmacographia* 275).

**OIL
662**

Oil—The fruit contains a volatile oil pale yellow with a pleasant aromatic odour. It is used in Europe in the manufacture of cordials and enters into the composition of fennel water which is employed medicinally but chiefly as a vehicle for other drugs. This water is distilled largely in India and sold under the name of *Arak bádián*.

**MEDICINE
Fruits
663
Root
664
Leaves
665**

Medicine—The FRUITS are used medicinally as a stimulant aromatic and carminative and are prescribed in colic diarrhoea and dysentery. The ROOT is regarded as purgative and the LEAVES as diuretic.

Besides these properties it is believed in some parts of the country that the fruits have a specific value. Thus in Madras they are said to be used as a medicine in venereal diseases.

SPECIAL OPINIONS—§ Stimulant aromatic and carminative in colic' (*Assistant Surgeon Nehal Sing Saharunpore*) 'The infusion of the seeds is used as a cooling drink in fever &c' (*Civil Surgeon F H Thornton B A, M B Monghyr*) "The seeds fried and powdered are used in dysentery with sugar" (*Assistant Surgeon T N Ghose Meerut*) Cold infusion of seeds very useful in colic and indigestion of children and an excellent vehicle for other medicines. Used also to relieve thirst in fever' (*Assistant Surgeon Shib Chunder Bhattacharya Chanda, Central Provinces*)

**FOOD
Pot herb
666
Leaves.
667**

Food—The plant is frequently cultivated as a pot herb in the plains. Its LEAVES are strongly aromatic and are used in fish sauces. Roxburgh wrote 'This plant is cultivated in various parts of Bengal during the

F 667

cold season for the seed which the natives eat with their betel, and also use in their curries" Seed time, the close of the rains, or about the end of October Harvest time, March

Trade.—The principal amount of fennel fruit sent to Bombay is from Jubbulpore Kupperwanj and Khândesh The value of the fruit in Bombay is Rs 3 to Rs 4 per Surat maund of 37½ lb The export trade has been increasing during the past ten years Thus in 1881-82 the total exports were 2201 cwt in 1887-88 they were 4353 cwt, valued at Rs 1260 Almost the whole quantity was exported from Bombay in the latter year viz 4,337 cwt Madras sending 15 cwt and Sind 1 cwt Great Britain received only 221 cwt of this amount France 975 cwt Belgium and Austria each 200 cwt the rest went to Eastern ports

The root is said by Irvine in his *Mat Med of Patna* to be worth Rs 8 per lb

TRADE
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FOOD, Human

In the account of any one product it has been the system in this work to follow uniformly an established skeleton Thus if it affords (1) a GUM that forms the subject of the first important paragraph and is followed in their order by (2) its DYES TANS or MORDANTS (3) its FIBRE (4) its OIL, (5) its MEDICINE (6) its FOOD or edible material (7) its TIMBER and last of all (8) the DOMESTIC AND SACRED uses to which the product is put

It has already been explained (under DOMESTIC AND SACRED) that it is intended to give in an Appendix a detailed classification of the substances which in a museum might be grouped according to these eight headings The reader is referred to FOOD AND FODDER in the Appendix but it may here be explained that food for men and animals may be grouped into—

- I Animal food materials
- II Mineral
- III Vegetable

Each of these is capable of a separate classification Thus under Vegetable food materials the chief sections might be given as (a) Cereals (b) Pulses (c) Vegetables and Tubers (d) Fruits and Nuts (e) Spices (f) Starches and Sugars and (g) Oils The reader will find a partial elaboration of (a) to (g) in their respective alphabetical positions in this work

(J F Duthse)

FOOD AND FODDER FOR CATTLE

The following enumeration in four sections may be given as the chief trees shrubs herbs and grasses known to afford food or fodder for cattle in the various parts of India

For geographical distribution vernacular names and other information reference should be made to the several articles relating to these plants in their alphabetical positions A review of the Indian Fodder question together with lists of fodders suited for different animals, will be found in the Appendix

I—FODDER PLANTS OF THE PLAINS

Acacia arabica Willd VERN *Batul* or *kikar* The tender shoots, leaves and green pods are much liked by cattle and the tree is greatly valued in regions affected by drought

A. Catechu, Willd Cattle eat the lower and small branches (R Thompson)

A. ferruginea, DC Cattle eat the lower and small branches (R Thompson)

A. Intsia, Willd var *cassia*. Cattle eat the leaves (R Thompson)

A. Jaquemontii, Benth A shrub thriving on rocky and sandy soils The branches are cut and the leaves thrashed out and given as fodder

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PLANTS
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- Acacia lenticularis*, *Ham* Cattle eat the leaves and small branches
- A leucophloea*, *Willd* Leaves and pods The latter however are considered by some to be poisonous and should be used with caution
- A modesta*, *Wall* The leaves and fallen blossoms are collected as cattle fodder
- A Suma*, *Kurz* VERN *Safed khair* Leaves and young branches (*R Thompson*)
- Achyranthes aspera*, *Linn* According to Mr T N Mukharji the young plants are given to cattle in Bengal in times of scarcity
- Adhatoda Vasica*, *Nees* The Conservator of Forests Northern Circle Bombay states that the leaves supply fodder for cattle This plant is abundant in Northern India but appears to be there used only as a medicine for cattle for the cure of colic
- Adina cordifolia* *Hook f* Leaves (*R Thompson*)
- Ægle Marmelos* *Correa* Bael tree Brandis mentions that the twigs and leaves are lopped for cattle fodder
- Ærua javamica*, *Fuss* Plant (*R Thompson*)
- Ailanthus excelsa*, *Roxb* Leaves (*R Thompson*)
- Albizia amara*, *Boivin* Leaves (*R Thompson*)
- A Lebbek*, *Benth* VERN *Siris* In Mysore the leaves of this tree are considered to be good fodder for cattle
- A odoratissima*, *Benth* The branches are lopped for cattle fodder
- A procera*, *Benth* Leaves (*R Thompson*)
- A stipulata*, *Boiv* The branches are lopped for cattle fodder
- Allium Cepa*, *Linn* Boiled onions are given with other food to milch cows and buffaloes in the Nasik District
- Alysicarpus rugosus* *DC* This and other species are eaten by cows and buffaloes in Bundelkhand
- Amarantus spinosus*, *Linn* This common wayside weed is often given to milch cows in Bengal Mr T N Mukharji says that chopped up and mixed with the boiled ends of rice-stems the preparation is considered highly lactiferous Other species of *Amarantus* many of which are cultivated as pot herbs might be substituted with advantage
- Amorphophallus campanulatus* *Bl* According to Mr T N Mukharji this plant when dead and dry is greedily eaten by cattle in Bengal and householders occasionally collect it for their cow
- Anogeissus acuminata*, *Wall* } Leaves (*R Thompson*)
- A latifolia* *Willd* }
- A pendula*, *Edgew* Bhai Sadhu Singh Forest Officer to the Jeypur State says that buffaloes and cattle eat the dry leaves of this tree
- Anthocephalus Cadamba*, *Benth & Hk f* The leaves are sometimes used as cattle fodder
- Antidesma diandrum*, *Roth* "Cattle eat the leaves (*Rev A Campbell Chutia Nagpur*)
- Arachis hypogæa*, *Linn* The ground nut is cultivated in many parts of India especially in the Bombay and Madras Presidencies The stems and leaves fresh or dry are greedily eaten and the oilcake is an excellent food for fattening cattle and increasing the quantity of their milk
- Argyrea speciosa*, *Sweet* Leaves (*Rev A Campbell*)
- Artocarpus integrifolia*, *Linn* The leaves of the jack fruit tree are considered fattening for cattle and according to Mr T N Mukharji the rind of the ripe fruit is greedily eaten by cattle as the greatest of luxuries
- A Lakoocha*, *Roxb* Extensively lopped for cattle fodder (*R Thompson*)
- Atriplex nummularia*, *Lindl* Baron Von Mueller in his *Select Plants*,

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FODDER.

I.
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- p 52 describes this as "one of the tallest and most fattening and wholesome of the Australian pastoral salt bushes. Sheep and cattle pastured on salt bush country are said not only to remain free of fluke, but to recover from this and other allied ailments. Experiments are still being undertaken to test the suitability of this species for planting on the *reh* infected tracts in Northern India the successful establishment of which in such localities would prove an undoubted gain.
- Atylosia mollis**, *Benth* Mentioned by the Rev A Oampbell as yielding fodder for cattle in Chutia Nagpur
- Balanites Roxburghii**, *Planch* The young twigs and leaves are said to be browsed by cattle
- Barringtonia acutangula**, *Gertn* Brandis says that the bark of this tree mixed with chaff and pulse is given as cattle fodder
- Basella alba** *Linn* According to Mr T N Mukharji the plant is given raw to cattle in Bengal
- Bassia latifolia** *Roxb* The leaves flowers and fruit of the mahua tree are eaten by cattle. The flowers are said to be very fattening
- Bauhinia purpurea**, *Linn* The leaves are lopped for cattle fodder (*Brandis*)
- B racemosa**, *Lamk* The leaves of this tree are said to be eaten by buffaloes in parts of Northern India
- B retusa**, *Roxb*
B Vahlu, *W & A*
B variegata *Linn* } The branches of these plants are often lopped for cattle fodder
- Bischofia javanica** *Bl* Buffaloes eat the leaves (*R Thompson*)
- Boerhaavia repanda**, *Willd* and **B diffusa**, are both occasionally eaten by cattle and in Bengal the latter is supposed to increase the quantity of milk. Another species **B verticillata**, *Poir*, is used in Rajputana as fodder
- Bombax malabaricum**, *DC* (Semal or Cotton tree) The twigs and leaves are lopped for fodder in the Hoshiarpur district and elsewhere
- Borassus flabelliformis**, *Linn* (Palmyra Palm) The shell enclosing the fruit and the yellow pulpy mass around the stones are eaten by cattle in Bengal. This food is considered fattening. The green calyx of the unripe fruit is also given to cattle (*T N Mukharji*)
- Boswellia serrata**, *Roxb* Buffaloes eat the leaves (*R Thompson*)
- Brassica campestris**, *Linn* var **glauca**. **VERN—Sarson** Largely grown in Northern India for the oil contained in the seed. The refuse after extracting the oil is given to cattle. In many parts of the Panjáb it is grown mainly as a fodder crop and cattle and camels are allowed to graze on it early in the season. In the Montgomery district it is grown either for fodder or for its seed. When used as fodder it is treated much in the same way as turnips. It is cut in January in order that it may yield a second crop. The pods after the removal of the seeds are given to cattle in Bengal. The extensive cultivation of *sarson* for oil production in Upper India renders its use for fodder of great value. The early fruiting variety called *Toria* is often plucked as green food for cattle in the Karnal district and probably elsewhere
- B campestris**, *Linn* var **Rapa** (Turnip) Turnips constitute a most important crop in many of the Panjáb districts where cattle are largely fed on the tops and roots. In the Jhang district the turnip and jowar crops afford strengthening food to the heavily worked well oxen during the wheat sowings and the first waterings. If the turnips fail, or are late owing to the failure of first sowings the working power of the bullocks is weakened and the wheat suffers from insufficient waterings. Sowings commence in September and go on till November. The crop

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- ripens in three months A first-class crop is that which yields a good fodder crop of leaves first and a heavy root crop afterwards (see *Gas of Jhang District* p 111) In the Gujranwala district turnips are largely grown often amongst the wheat in the highly cultivated lands bordering the Chenab grass being very scarce A dry season is favourable to a good crop of turnips and an extension of their cultivation would alleviate one of the worst dangers of a drought the failure of fodder for cattle (*Gas of Gujranwala* p 54) In the district of Dera Ismail Khan turnips are grown principally as cattle fodder and in the Kachi tracts as a head rather than as a root crop They are extensively cultivated in the Montgomery district and from the middle of November the crop is used as fodder In Muzaffargarh they are mostly used as fodder and ripen just in time to relieve the failing stocks of other kinds of fodder In the Multan district cattle are fed on turnips from 15th November to the 1st February
- Brassica campestris* Linn var *Toria*** Often used as green fodder in the Karnál district (Panjáb)
- B juncea* H f & T** Sometimes given as green fodder, when other kinds of food are scarce
- Briedelia montana*, Willd** The leaves are lopped for cattle fodder (*Brandis*)
- B retusa*, Spreng** The leaves are valued as fodder and the tree is frequently lopped (*Brandis*) Cattle fed on these leaves are said to be cured of worms
- Broussonetia papyrifera*, Vent** (Paper Mulberry) This valuable fibre plant can be easily cultivated in almost any kind of soil and the foliage will probably be found to be a useful fodder for cattle
- Buchanania angustifolia*, Roxb** Buffaloes eat the leaves (*R Thompson*)
- B latifolia* Roxb**—The leaves of this tree are said to be given as fodder in the Savantvadi district Bombay and according to Mr R Thompson they are similarly employed in the Central Provinces
- Bursera serrata*, Colebr** Buffaloes eat the leaves (*R Thompson*)
- Butea frondosa* Roxb** The *Dhák* tree Buffaloes are very fond of the leaves and their milk is said to be improved thereby They are said to be more wholesome if given when not quite fresh Camels and goats will not touch this tree
- B superba*, Roxb** A large climbing shrub the leaves of which according to the Rev A Campbell are eaten by cattle in Chutia Nagpur and by buffaloes as stated by Mr R Thompson
- Buettneria herbacea*, Roxb** Plant (*R Thompson*)
- Cajanus indicus*, Spreng** VERN *Arhar* Largely cultivated in most parts of India The leaves and pod shells are considered excellent feeding for cattle The husks and broken grain soaked in water are sometimes given to cattle to keep them quiet when being milked
- Calendula officinalis*, Linn** A weed of cultivation in the Western Panjáb and Sind It is supposed to increase the flow of milk in cows
- Calotropis gigantea*, R Br** In Chutia Nagpur cattle eat the leaves (*Rev A Campbell*)
- C procera*, R Br** Cattle will eat the dried leaves
- Careya arborea*, Roxb** The fruit is said to be eaten by cattle in the Kánara district of Bombay
- Carthamus tinctorius*, Linn** The chaff of this plant is said to be sold as fodder for cattle in the Bulandsharh district The oil-cake is rather bitter and is apt to taint the milk
- Cassia Fistula*, Linn** VERN *Amaltás* The twigs and leaves are lopped for cattle fodder in Oudh and Kumaon (*Brandis*)

Food and Fodder	(F F Duthie)	FODDER.
<i>Cedrela Toona</i> , <i>Roxb</i> (<i>Toon tree</i>) In some parts of the hills the young shoots and leaves are lopped as cattle fodder (<i>Brandis</i>) The seeds also are sometimes given to cattle as a fattening food		I FODDER PLANTS OF THE PLAINS
<i>Celastrus paniculata</i> , <i>Willd</i> Cattle eat the leaves in Chutia Nagpur (<i>Rev A Campbell</i>) also eaten by buffaloes (<i>R Thompson</i>)		
<i>Ceratonia Siliqua</i> , <i>Linn</i> (<i>The Carob tree</i>) Cattle are fond of the sweet pods and will also browse on the foliage if allowed to do so <i>Baron Von Mueller</i> states that in some of the Mediterranean countries horses and stable cattle are almost exclusively fed upon the pods The fattening properties of these pods which contain about 66 per cent of sugar and gum are twice those of oil-cake To horses and cattle 6th a day are given of the crushed pods raw or boiled with or without chaff		
<i>Cicer arietinum</i> <i>Linn</i> (<i>Chick Pea or Bengal gram</i>) Largely grown as a rabi crop in Northern and Central India The grain known generally as <i>chana</i> is staple food in Northern India for cattle and horses In some districts of the Panjáb cattle and horses are allowed to graze on the young plants If after this the crop gets rain the plants grow up all the stronger for having been grazed over they tiller better The custom of allowing cattle to graze on the green crops is very prevalent in some of the Panjáb districts especially that of Jhang where the agricultural population depend so much on their cattle for their sustenance. (See <i>Gas of Jhang</i> p 109) In the Montgomery district the dry stalks and leaves of gram are considered injurious to milch cattle In the Karnál district the <i>bhusa</i> or straw is considered admirable fodder and is also very well thought of in the Hoshiarpur district In Bengal it is said to be not liked by cattle on account of its bitter taste In the Ahmednagar district (Bombay) the <i>bhusa</i> is carefully preserved as cattle food When the grain is thrashed or trodden out by cattle the pod shells are separated by winnowing and used as manure or burnt as they are considered owing to their sharpness liable to injure the mouths of cattle		
<i>Cistanche tubulosa</i> <i>Wight</i> A curious and rather handsome herb parasitical on the roots of <i>Æruea javanica</i> and <i>Calligonum polygonoides</i> , and found on sandy ground in parts of the Panjáb and in Sind <i>Stewart</i> , under its synonym <i>Phelipsea Calotropidis</i> , <i>Walp</i> says that the upper portion of the plant is given as fodder to oxen		
<i>Citrullus Colocynthus</i> , <i>Schrad</i> The fruit is said to be relished by buffaloes		
<i>C vulgaris</i> <i>Schrad</i> — (<i>Water melon</i>) In the Dera Ismail Khán district cattle are sometimes fed on the raw fruit and the seeds are carefully preserved as cattle food during the winter The seeds are also given to cattle in the Malláni district of Rájputána		
<i>Clerodendron phlomisoides</i> , <i>Linn f</i> } Buffaloes eat the leaves (<i>R Thompson</i>) <i>C serratum</i> , <i>Spreng</i> } son)		
<i>Cocos nucifera</i> , <i>Linn</i> (<i>Cocoa nut Palm</i>) In the Thána district of Konkan the refuse after the oil has been pressed out is sometimes given to cattle		
<i>Cocculus villosus</i> , <i>DC</i> Cows and buffaloes eat it (<i>Roxburgh</i> under <i>Menispermum hirsutum</i>)		
<i>Cochlospermum Gossypium</i> , <i>DC</i> Buffaloes eat the leaves and flowers (<i>R Thompson</i>)		
<i>Colebrookia oppositifolia</i> , <i>Smith</i> Buffaloes are said to be fond of the leaves of this shrub		
<i>Colocasia antiquorum</i> , <i>Schott</i> In Bengal, according to Mr T N Mukharji yams are cut into small pieces and boiled either alone or mixed with rice ends or with portions of <i>Amarantus spinosus</i> , and given to cattle		

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- Combretum ovalifolium*, Roxb Buffaloes eat the leaves and young shoots (*R Thompson*)
- Commelina bengalensis*, Linn This plant is said by Bhai Sadhu Singh to be given as fodder to cattle in the Jeypur State
- Convolvulus arvensis*, Linn Gathered by village children as fodder for cattle (see Vol II, p 519)
- C. pluricaulis*, Choss Mentioned by Stewart as being eaten by cattle and considered cooling
- Corchorus olitorius*, Linn (Jute) Leaves eaten by cattle after the plant is cut for fibre
- Cordia Macleodu*, H f & T Buffaloes eat the leaves (*R Thompson*)
- C. Myxa*, Linn The leaves are given to cattle
- C. Rothu* R & S Buffaloes eat the leaves (*R Thompson*)
- Cratogeomys religiosa*, Forst Buffaloes eat the leaves and fruit (*R Thompson*)
- Crinum*, sp The flowers of this (apparently undescribed) species are according to the Rev A Campbell eaten by cattle
- Crotalaria juncea*, Linn (Sunn Hemp) Cultivated for its fibre, and also according to Roxburgh in parts of the Northern Circars as a fodder plant for milch cows The stems are used as fodder in the Kistna district (Madras) and also in Godavari where they are stored in bundles and covered over with palmyra leaves to protect them from rain The seeds are also collected and given to cattle in some parts of India
- C. limifolia*, Linn f An annual common throughout India Roxburgh says that cattle eat it
- C. medicaginea* Lamk The plant is eaten by cattle in Bundelkhand and Rájputána
- Croton oblongifolius*, Roxb Cattle eat the leaves in Chutia Nagpur (*Rev A Campbell*)
- Cyamopsis psoralioides*, DC VERN Guár Cultivated during the rains in various parts of India The pods are used as human food and the seeds are given to cattle and horses in the former case it is grown as a garden crop and in the latter as a field crop being often sown with *dajra* It is largely grown for cattle in the Meerut Division also in some of the Panjáb districts in light soils It is sometimes given green to bullocks
- Cyanotis axillaris*, R & S Cattle are very fond of this plant' (*Roxburgh*)
- C. tuberosa*, R & S Cattle eat the plant (*Rev A Campbell*)
- Cyperus longus* Linn Mr T N Mukharji says that in Bengal this plant is weeded out from fields and given to cattle
- C. rotundus*, Linn VERN Mothá Cattle eat this plant Other species of CYPERACEÆ known under the general name of *dila* are eaten by cattle and especially by buffaloes
- Dalbergia lanceolaria*, Linn Buffaloes eat the leaves (*R Thompson*)
- D. latifolia*, Roxb In Oudh according to Brandis the tree is pollarded for cattle fodder In the Bombay Presidency also it is said to be used for fodder
- D. Sissoo*, Roxb (The Shisham tree) Cattle are fond of the young shoots and leaves and will browse freely on them if allowed to do so
- D. volubilis*, Roxb Cattle eat the leaves in Chutia Nagpur (*Rev A Campbell*) and in the Central Provinces (*R Thompson*)
- Daucus Carota*, Linn (The Carrot) A most valuable crop for tracts affected by periodical droughts Cattle eat both the tops and the roots and in Kolhápúr they are frequently given to milch cows In Cutch carrots are largely grown both for fodder and for pickling

Food and Fodder	(F F Duthie)	FODDER.
<i>Derris scandens</i> , Benth Cattle eat the leaves and pods (<i>R Thompson</i>) <i>Desmodium Cephalotes</i> , Wall Cattle eat the leaves of this shrub in Chutia Nagpur (<i>Rev A Campbell</i>)	I. FODDER PLANTS OF THE PLAINS.	
<i>D diffusum</i> , DC 'Cattle eat this species greedily and as it grows quickly and with luxuriance it might be cultivated with advantage' (<i>Roxburgh</i> under <i>Hedysarum quadrangulatum</i>)		
<i>D parvifolium</i> , DC A trailing herbaceous perennial, common in the plains it is eaten by cattle and other animals		
<i>D pulchellum</i> , Benth Cattle eat the leaves and shoots (<i>R Thompson</i>)		
<i>D triflorum</i> , DC Similar in habit to the preceding and equally abundant <i>Roxburgh</i> (under <i>Hedysarum triflorum</i>) remarks that it is very common on pasture ground and helps to form the most beautiful turf we have in India He also says that cattle are very fond of it <i>Baron Von Mueller</i> recommends this species for places too hot for ordinary clover and as representing a large genus of plants many of which may prove of value for pasture Forty nine species are described in the <i>Flora of British India</i>		
<i>Dichrostachys cinerea</i> , W & A Buffaloes eat the leaves and pods (<i>R Thompson</i>)		
<i>Digera arvensis</i> Forsk Mainly used as a fodder for cattle in South Baluchistan (<i>Dr R P Banerji</i>)		
<i>Dillenia aurea</i> , Smith Buffaloes eat the young leaves and fruit (<i>R Thompson</i>)		
<i>D pentagyna</i> , Roxb Young leaves and fruit (<i>R Thompson</i>)		
<i>Dioscorea bulbifera</i> Linn Leaves (<i>Rev A Campbell</i> Chutia Nagpur)		
<i>D oppositifolia</i> Linn Plant (<i>Rev A Campbell</i> Chutia Nagpur)		
<i>Diospyros Embryopteris</i> , Pers } Buffaloes eat the young leaves (<i>R Thompson</i>)		
<i>D melanoxylon</i> Roxb } (<i>Thompson</i>)		
<i>D montana</i> Roxb Leaves (<i>R Thompson</i>)		
<i>Dolichandrone falcata</i> , Seem Buffaloes eat the young leaves in the Central Provinces (<i>R Thompson</i>)		
<i>Dolichos biflorus</i> Linn (Horse gram of Madras) Chiefly grown in South India for its grain which is largely used for feeding horses The stems and leaves green or dry are considered to be good fodder for cattle In parts of the Panjáb and in Káthiawar it is grown only for fodder and is given to cattle green or dry		
<i>D Lablab</i> Linn (Cow gram of Mysore) The leaves and stalks are considered a valuable fodder for milch cows and the pulse is given to cattle in the Madras Presidency		
<i>Dregea volubilis</i> , Benth Cattle eat the leaves in Chutia Nagpur (<i>Rev A Campbell</i>)		
<i>Ehretia acuminata</i> , Br Buffaloes eat the leaves (<i>R Thompson</i>)		
<i>E laevis</i> , Roxb Leaves (<i>Brandis</i>)		
<i>Elaeodendron glaucum</i> , Pers Leaves (<i>R Thompson</i>)		
<i>Equisetum debile</i> Roxb Sometimes given to cattle as fodder (<i>Stewart</i>)		
<i>Eriodendron anfractuosum</i> , DC (Kapok tree) Oil-cake		
<i>Erioglossum edule</i> , Bl Buffaloes eat the leaves in Oudh (<i>R Thompson</i>)		
<i>Eriolena Hookeriana</i> , W & A Buffaloes eat the leaves in the Central Provinces (<i>R Thompson</i>)		
<i>Eruca sativa</i> , Lamk Largely used in the Panjáb as a green fodder for cattle and often specially cultivated for this purpose The oil-cake is also given to cattle		
<i>Erycibe paniculata</i> Roxb Buffaloes eat the leaves (<i>R Thompson</i>)		
<i>Erythrina indica</i> , Lamk } Buffaloes eat the leaves (<i>R Thompson</i>) <i>E suberosa</i> , Roxb }		

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L FODDER PLANTS OF THE PLAINS	<i>Eugenia Jambolana, Lamk</i> } <i>E operculata, Roxb</i> } Buffaloes eat the leaves and fruit (<i>R</i> <i>E Heyneana, Wall</i> } <i>Thompson</i>) <i>Euphorbia helioscopia, Linn</i> Cattle eat this plant in Beluchistan (<i>Dn</i> , <i>R P Banerji</i>)
	<i>Farsetia Jacquemontii, Hk f & T</i> Eaten by cattle in the Panjáb <i>Feronia elephantum, Correa</i> Buffaloes eat the leaves and fruit (<i>R</i> <i>Thompson</i>)
	<i>Ficus Cunia, Buch</i> Buffaloes eat the leaves
	<i>F glomerata, Roxb</i> Leaves and fruit.
	<i>F hispida, Linn</i> Much lopped for cattle fodder (<i>Brandis</i>)
	<i>F infectoria, Roxb</i> Leaves (<i>Brandis</i>)
	<i>F palmata, Forsk</i> (= <i>F virgata, Roxb</i>) Leaves
	<i>F Roxburghii Wall</i> Leaves (<i>Brandis</i>)
	<i>F Rumphii, Bl</i> (= <i>F cordifolia, Roxb</i>) Leaves (<i>Brandis</i>) Buffaloes
	eat the leaves (<i>R Thompson</i>)
	<i>F saemocarpa, Miq</i> Leaves (<i>Madden</i>)
	<i>Flacourtia Ramontchi, L Hérit</i> Leaves (<i>Brandis</i>)
	<i>F sepiaria, Roxb</i> Leaves
	<i>Flemingia strobilifera, R & Br</i> Buffaloes eat the plant in the Central
	Provinces (<i>R Thompson</i>)
	<i>Flueggia Leucopyrus, Willd</i> Buffaloes eat the leaves in the Central
	Provinces (<i>R Thompson</i>)
	<i>Gardenia latifolia, Ast</i> Leaves eaten by cattle in Chutia Nagpur (<i>Rev</i> <i>A Campbell</i>) and by buffaloes in the Central Provinces (<i>R Thomp</i> <i>son</i>)
	<i>Garuga pinnata, Roxb</i> Leaves (<i>R Thompson</i>)
	<i>Gmelina arborea, Roxb</i> Cattle are fond of the fruit (<i>Gas, Kolaba Dist,</i> <i>Bombay, p 24</i>)
	<i>Gossypium herbaceum Linn</i> (Cotton) The seed is a valuable food for milch cattle The oil cake is also largely given In some districts cattle are allowed to graze on the leaves and shoots after the cotton picking is over
	<i>Grewia laevigata, Vahl</i> Twigs and leaves in North Western Provinces
	(<i>Brandis</i>)
	<i>G tiliaefolia, Vahl</i> Leaves (<i>Brandis</i>)
	<i>G vestita, Wall</i> Leaves
	<i>Guazuma tomentosa, Kunth</i> Leaves valued for fodder in the Bombay
	Presidency
	<i>Guizotia abyssinica, Cass</i> The oil cake is much prized for milch cattle
	<i>Hamiltonia suaveolens, Roxb</i> Buffaloes eat the leaves (<i>R Thompson</i>)
	<i>Hardwickia binata, Roxb</i> VERN Anjan Cattle are exceedingly fond of the leaves In the Cauvery forests, Northern Mysore and Berar, the trees were formerly, and are still to a great extent pollarded for cattle fodder (<i>Brandis</i>)
	<i>Helicteres Isora Linn</i> Buffaloes eat the leaves (<i>R Thompson</i>)
	<i>Heterophragma Roxburghii, DC</i> Leaves much eaten by cattle (<i>Gas,,</i> <i>Thana Dist p 27</i>)
	<i>Hibiscus cannabinus, Linn</i> In the Poona district the seed is sometimes
	given to cattle
	<i>Hippocratea arborea, Roxb</i> Buffaloes eat the leaves (<i>R Thompson</i>)
	<i>Hiptage Madagblota, Gertn</i> Leaves (<i>R Thompson</i>)
	<i>Holarrhena antidysenterica, Wall</i> Leaves (<i>R Thompson</i>)
	<i>Holoptelea integrifolia, Planch</i> (= <i>Ulmus integrifolia, Roxb</i>) The leaves are lopped for cattle fodder and the tree is often used to stock fodder for winter supply" (<i>Brandis</i>)

Food and Fodder	(J F Duthie)	FODDER
Holostemma Rheedii , Wall Cattle eat the plant in Chutia Nagpur (Rev A Campbell)		I. FODDER PLANTS OF THE PLAINS.
Hymenodictyon excelsum , Wall Leaves		
Indigofera cordifolia , Heyne Buffaloes are fond of this plant		
I. enneaphylla Linn Helps to form the best pasture lands in Bengal where it is always found in plenty (Roxburgh)		
I. glandulosa , Willd Cattle are fond of the plant (Roxburgh)		
I. linifolia , Retz Plant The seeds of this and other species of wild indigo are highly nitrogenous		
I. paucifolia , Del Plant		
I. pulchella , Roxb Cattle eat the leaves in Chutia Nagpur (Rev A Campbell)		
Ipomoea aquatica , Forsk VERN Kalmi ' This plant is given to cattle in Bengal dried and smoked like <i>nâr</i> grass and is considered lactiferous ' (T N Mukharji)		
I. Batatas , Lamk (Sweet potato) The stems are considered excellent fodder for cattle		
Ixora parviflora , Vahl Buffaloes eat the leaves in the Central Provinces (R Thompson)		
Kydia calycina Roxb Buffaloes eat the leaves in the Central Provinces (R Thompson)		
Kyllingia monocephala , Linn The plants are given to cattle in Bengal (T N Mukharji)		
Lagenaria vulgaris , Seringe (Bottle-gourd) In Bengal the fruit chopped up with rice-ends (<i>khud</i>) is often given to milch cows In the Kolhapur district of Bombay the fruit when grown in abundance is chopped up and given to buffaloes		
Lagerstroemia parviflora Roxb Buffaloes eat the leaves (R Thompson)		
Lathyrus Aphaca , Linn A cold season weed of cultivated ground in Northern India It is often pulled up and given as fodder to cattle		
L. imphalensis , Watt MS Used as fodder in Manipur		
L. sativus Linn Grown in the Panjâb chiefly as green fodder for cattle In the Montgomery district however the dry stalks and leaves are considered good cattle fodder In some parts of Bengal according to Mr T N Mukharji it is sown broadcast among transplanted rice after the rains when the land is still wet The plants grow up luxuriantly after the rice has been reaped and then the cattle are allowed to graze upon them It is also sown in this way on river banks or silts deposited by the annual inundations, and the crop is either grazed or allowed to ripen its seed		
Lens esculenta , Manch (Lentil) The dry stalks and leaves are sometimes given to cattle, though considered by some to be a heating form of food		
Lepidium Draba , Linn A common wayside weed at Quetta Judging from the extent to which it is used as green fodder for cattle and other animals in that neighbourhood it deserves attention		
Linum usitatissimum , Linn Linseed cake is given to cattle in Bengal but to a limited extent as most of the seed is exported Cattle are fed however on the empty capsules (T N Mukharji)		
Litsea sebifera , Pers Buffaloes eat the young leaves (R Thompson)		
Mallotus philippinensis , Mull VERN Kamela Buffaloes eat the leaves (R Thompson)		
Mangifera indica , Linn (Mango) In Bengal the rinds and stones are sometimes given to cattle The latter when ripe are swallowed entire and after becoming soft in the stomach they are brought up as a cud the kernels are then pressed out and eaten, and the refuse rejected		

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(*T N Mukharji*) In dry seasons buffaloes eat the leaves (*R Thompson*)
Marsdenia tenacissima, *W & A* Buffaloes eat the leaves (*R Thompson*)
Medicago denticulata, *Willd* A cold season weed largely used as green
 fodder in the Panjáb and considered good for milch cows

M lupulina, *L* (Hop trefoil) A cold season weed of Northern India
 often collected for fodder and worthy of cultivation in the Panjáb
Sutton in his *Permanent and Temporary Pastures* p 71, says that
 the herbage is more nutritious than that of Red clover and helps to make
 a good bottom to a pasture and that it is supposed to impart colour and
 good flavour to butter

M sativa *Linn* Lucerne is now well known all over India as a very
 valuable green fodder crop especially for horses It should be given
 however only as a supplement to the ordinary food as animals will always
 suffer if allowed to eat as much of it as they will Mixed with the
 chopped straw of oats barley or wheat it forms a very wholesome feed
 For further information see the article on *Lucerne* under *Medicago*

Melia Azadirachta, *Linn* (The Neem tree) } The leaves are said to be
M Azedarach, *Linn* (Persian Lilac) } given as fodder to cattle
 in the Ahmednagar dis-
 trict of Bombay

Melilotus parviflora, *Desf* Very common in Northern India as a cold sea-
 son weed of cultivation and largely used in the Panjab as green fodder for
 cattle It is said to be cultivated in some districts for this purpose An
 allied species with white flowers (*M alba*, *Lamk*) has been known
 to give colic to cattle but all plants especially of the clover kind if
 eaten in excess in the green state are liable to cause this complaint

Milium velutina, *Hk f & T* *VERN Dom sál* Buffaloes eat the leaves
 (*R Thompson*)

Milletia auriculata, *Baker* This climber is extensively lopped to afford
 fodder to buffaloes (*R Thompson*)

Mimusops hexandra, *Roxb* *VERN Khurni* Buffaloes eat the leaves in
 the Central Provinces (*R Thompson*)

Morinda tinctoria, *Roxb* *VERN Al* In the Rewa Kántha district of Bom-
 bay the leaves are given to cattle when grass and forage are scarce

Morus indica, *Linn* The leaves are said to be a good fodder for cattle

Musa paradisiaca, *Linn* (The Plantain) Chopped into small pieces it
 is largely used as fodder in many parts of India, and according to *Mr*
T N Mukharji it forms the staple food of cattle in parts of the Hughli
 district It cannot however be very nutritious and is apt to cause
 diarrhoea *Mr Mukharji* also says that the white portion of the root is
 chopped fine and given to cattle and is a more substantial food than
 the stems Cattle are very fond too of the skin of the fruit, and the
 flowers when available

Nyctanthes Arbor tristis *Linn* *VERN Harsinghar* Buffaloes eat the
 young leaves (*R Thompson*)

Ochna squarrosa, *Roxb* Buffaloes eat the leaves in the Central Pro-
 vinces (*R Thompson*)

Ocimum canum, *Sims* Cattle eat the leaves in Chutia Nagpur (*Rev A*
Campbell)

Odina Wodier, *Roxb* This tree is often lopped and pollarded the leaves
 and branches being a favourite fodder of cattle (*Brandis*)

Olea cuspidata *Wall* The leaves are said to be good fodder for cows and
 milch buffaloes (*Gas Rawal Pindi* p 80)

Opuntia Dillenii *Haworth* (Prickly Pear) This is the kind which grows
 so plentifully in Southern India, and were it not for the spines it might be
 used with advantage as a profitable adjunct to the ordinary food of cattle

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<p>especially in times of scarcity Dr Shortt (<i>Indian Forester</i>, Vol III p 233) refers to a spineless form on which Mr H S Thomas, then Collector of Tanjore, fed his cattle It has been found possible to preserve the stems and leaves in silos and the product mixed with grass was pronounced by Mr Hooper to be wholesome food for cattle (See <i>Bulletin of Useful Information Royal Gardens Kew</i> 1888 p 173)</p>		<p>I FODDER PLANTS OF THE PLAINS</p>
<p><i>Ougenia dalbergioides</i>, Benth The branches are often lopped for cattle fodder</p>		
<p><i>Oxalis corniculata</i>, Linn Cattle eat this plant in Chutia Nagpur (Rev A Campbell)</p>		
<p><i>Pæderia foetida</i> Linn [<i>Your Agri Hort Soc Ind VII</i> 224 In the publication referred to it is stated that this climber is greedily eaten by elephants — Ed]</p>		
<p><i>Papaver somniferum</i>, Linn Poppy seed cake is given to cattle in Bengal, but the supply is insignificant (T N Mukharji)</p>		
<p><i>Pavetta indica</i> Linn var <i>tomentosa</i> Buffaloes eat the leaves in the Central Provinces (R Thompson)</p>		
<p><i>Phaseolus aconitifolius</i> Jacq VERN <i>Moth</i> The grain is often given to cattle and is said to be very fattening It is believed however to reduce the flow of milk if given to milch cattle The stems and leaves green or dry are highly valued as fodder</p>		
<p><i>P calcaratus</i> Roxb Is mentioned as yielding fodder for cattle</p>		
<p><i>P Mungo</i>, Linn VERN <i>Mung</i> The grain is considered fattening for horned cattle and is sometimes given boiled and mixed with <i>ghis</i> Roxburgh says that cattle do not like the straw and in Mysore it is looked upon as useless In the Panjáb however it is thought highly of, though valued less than that of <i>moth</i> and <i>urd</i></p>		
<p><i>P Mungo</i> Linn var <i>radiatus</i> VERN <i>Urd</i> The grain of this is also given as a fattening food to cattle Roxburgh says that cattle eat the straw and that it is considered nourishing In Mysore it is thought to be harmful to cattle and is therefore used as manure or for feeding camels The husks are much valued in the Madras Presidency</p>		
<p><i>P trilobus</i> Ait The grain which is sometimes called Red gram is used for feeding cattle and in Coimbatore is sown chiefly for that purpose</p>		
<p><i>Phoenix dactylifera</i>, Linn In Káthiawar cattle feed on the local dates called <i>khalela</i> and the refuse of the distilleries is eagerly eaten by them</p>		
<p><i>Phyllanthus Emblica</i>, Linn VERN <i>Amla</i> Buffaloes eat the leaves and fruits (R Thompson)</p>		
<p><i>P urinaria</i>, Linn Roxburgh says that cattle eat this herb</p>		
<p><i>Piptadenia oudhensis</i>, Brand The tree is pollarded for cattle fodder (Brandis)</p>		
<p><i>Pisum sativum</i>, Linn (Common Pea.) In many parts of the Panjáb this and probably also the Field Pea (<i>P arvense</i>, Linn) is grown only as a fodder crop for cattle It is considered excellent fodder whether green or dry The straw is also used as cattle fodder in Berar and in the Bombay Presidency In Bengal according to Mr T N Mukharji, the seeds are given to cart bullocks but only in towns</p>		
<p><i>Pithecolobium dulce</i>, Benth (Manilla Tamarind) Introduced from Mexico Cattle eat the pods</p>		
<p><i>P saman</i>, Benth (Rain tree of South America.) Thrives in localities free of frost The sweet pods are relished by cattle</p>		
<p><i>Poinciana elata</i>, Linn Planted near villages in Western India, and the foliage is given as fodder to cattle</p>		
<p><i>Polyalthia cerasoides</i>, Benth & Hk f { Buffaloes eat the leaves in the <i>P suberosa</i>, Benth & Hk f { Central Provinces (R Thompson)</p>		

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- Polygonum barbatum*, Linn } Roxburgh says that cattle are fond of
P chinense, Linn } these plants
P tomentosum, Willd } Cattle eat it greedily (*Roxburgh*)
Pongamia glabra, Vent (Indian Beech) Cattle are said to be fond of
the leaves of this tree It is almost evergreen, and is much used for
planting along road sides Grass grows well under its shade
Populus euphratica, Oliv } The leaves afford fodder for cattle and the
P nigra, Linn } tree is lopped occasionally for that pur-
pose (*Brandis*)
Portulaca oleracea, Linn Cattle eat this herb in Chutia Nagpur (*Rev*
A Campbell)
Premna integrifolia, Linn } The leaves are a good fodder for cattle
P latifolia, Roxb } (*Brandis*)
Prosopis juliflora, Benth (Mesquite Bean) Introduced from Texas
The sweet pods are much liked by cattle It thrives well in Upper
India even on poor soils
P spicigera, Linn VERN *Jand* The pods are eaten by cattle Though
not so nutritious as the fresh pods of the *babul* they can be kept good
longer
Psoralea corylifolia, Linn The plant is eaten by cattle in Bundelkhand
Pterocarpus Marsupium Roxb (Bastard Teak) The leaves are a fa-
vourite food of cattle
Pueraria tuberosa, DC The leaves are considered to be good fodder for
cattle
Putranjiva Roxburghii, Wall The leaves are lopped for cattle fodder
(*Brandis*)
Randia dumetorum, Lamk The leaves are lopped and used as cattle
fodder (*Brandis*)
R uliginosa, DC The leaves are browsed by cattle (*Brandis*)
Raphanus sativus Linn (Radish) The oil cake although much liked
is given to cattle only in certain parts of Northern Bengal (*T N*
Mukharji)
Rhizophora mucronata, Lamk The leaves of the Mangrove tree are large-
ly used in Kathiawar to feed cattle and the berries are said to increase
their milk giving powers In the Kistna district of Madras cattle eat the
dried leaves
Ricinus communis, Linn (Castor) The oil cake is given to cattle in
Sind according to *Stocks* In Bengal it is used as manure (*T N*
Mukharji)
Saccopelatum tomentosum, Hk f & T The leaves are used as cattle
fodder
Salix acmophylla, Boiss About Quetta the tree is much lopped for
cattle fodder (*Brandis*)
S tetrasperma, Roxb The tree is often lopped for cattle fodder (*Brandis*)
Salvadora oleoides Dene VERN *Jál* The fruit is said to be eaten by
cattle of the highlands of the Rohtak district
Sapindus Mukorossi, Gartin The leaves are given as fodder to cattle
(*Brandis*)
Schleichera trjuga, Willd In Oudh this tree is lopped and the twigs
and leaves are used as cattle fodder Mr *Smythies* says that the fruit
also is eaten by cattle
Scirpus barbatus, Roxb The plant is used as fodder for cattle in the
Jeypur State (*Bhai Sádhu Singh*)
S maritimus, Linn Fair forage for cattle
Sesamum indicum, DC (Gingelly or Til) The oil cake is a fattening
food for milch cattle, and by those who can afford it is often given to

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hard working oxen The empty capsules are also given to cattle. In the Baroda State bruised sesamum is given mixed with bruised gram		I FODDER PLANTS OF THE PLAINS.
<i>Sesbania aegyptiaca</i> , Pers VERN <i>Jait</i> Cattle are very fond of the foliage		
<i>S grandiflora</i> , Pers Cattle eat the leaves and tender parts (<i>Roxburgh</i>)		
<i>Shorea robusta</i> , Gærtn VERN <i>Sál</i> Cows and buffaloes are fond of the young leaves; the <i>Sál</i> trees of the Government forests in Garhwál used to be extensively lopped for feeding buffaloes, but this practice is now forbidden		
<i>Smithia sensitiva</i> , Ast Makes excellent hay (<i>Roxburgh</i>)		
<i>Sonchus oleraceus</i> , Linn Cattle are fond of this plant		
<i>Soyimida febrifuga</i> , A Fuss Buffaloes eat the young leaves in the Central Provinces (<i>R Thompson</i>)		
<i>Spondias mangifera</i> , Pers (Hog Plum) Cattle eat the leaves (<i>R Thompson</i>) and according to Mr Smythies the fruit		
<i>Stereospermum chelonoides</i> , DC	} Buffaloes eat the young leaves (<i>R Thompson</i>)	
<i>S suaveolens</i> , DC		
<i>S xylocarpum</i> , Wight		
<i>Stephegyne parvifolia</i> , Korth VERN <i>Kaddam</i> Cattle eat the leaves		
<i>Sterculia colorata</i> , Roxb Twigs and leaves lopped for cattle fodder (<i>Brandis</i>)		
<i>S villosa</i> , Roxb The leaves are given to cattle in the Savantvádi district of Bombay		
<i>Streblus asper</i> , Lour The leaves are lopped extensively for cattle fodder (<i>Brandis</i>)		
<i>Strobilanthes callosus</i> , Nees VERN <i>Karvi</i> (Bombay) This shrub flowers profusely about every eight or nine years and then becomes covered with a sticky exudation (<i>mel</i>) Herds of cattle gather from all sides to feed on it (<i>Gas Thána district p 43</i>) This plant is abundant on Mount Abu where it flowered abundantly in 1887		
<i>Symphytum peregrinum</i> , Ledeb (Prickly Comfrey) Yields excellent fodder for milch cattle but requires too expensive treatment for general use A hill climate such as that of the Nilghiris appears to suit it best		
<i>Tecoma undulata</i> G Don The leaves are greedily browsed by cattle Recommendable for tracts subject to droughts		
<i>Tectona grandis</i> Linn f (Teak) In the Baroda State cattle are said to be often fed on its twigs and leaves		
<i>Tephrosia purpurea</i> Pers Cattle feed on this plant		
<i>Terminalia Arjuna</i> Bedd Cattle eat the leaves in Chutia Nagpur (<i>Rev A Campbell</i>) and the young leaves are eaten by buffaloes (<i>R Thompson</i>)		
<i>T belerica</i> , Roxb VERN <i>Bahera</i> In the Kángra district the leaves are considered to be the best fodder for milch cows		
<i>T Chebula</i> , Retz VERN <i>Harar</i> Cattle are said to eat the leaves of this tree		
<i>T tomentosa</i> , W & A The leaves are lopped for cattle fodder (<i>Brandis</i>)		
<i>Thespesia Lampas</i> , Dals & Gbs Buffaloes eat the leaves in the Central Provinces (<i>R Thompson</i>)		
<i>Tiliacora racemosa</i> , Colebr Buffaloes eat the leaves in Oudh (<i>R Thompson</i>)		
<i>Tinospora cordifolia</i> , Miers VERN <i>Golanchar</i> This twining plant which is common on trees in Bengal villages is greedily eaten by cattle People gather it occasionally and give it to their animals cut into small pieces It is said to increase the flow of milk in milch cows, but it gives a smell to the milk (<i>T N Mukharji</i>)		

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Trewia nudiflora, Linn Buffaloes eat the leaves in Oudh (*R Thompson*)

Trianthema pentandra, Linn Eaten by cattle

Trigonella Foenum græcum, Linn (Fenugreek) Is grown extensively in the Panjáb, where it is used chiefly as a green fodder for cattle It yields only one cutting

Turpina pomifera, DC The leaves are used as fodder

Vangueria spinosa, Roxb The leaves are said to be a useful fodder in the Thána district of Bombay

Ventilago calyculata, Tulasne Buffaloes eat the leaves in the Central Provinces (*R Thompson*)

Vicia Faba, L VERN *Bakla* The seeds are sometimes given to cattle

V hirsuta, Koch Cultivated locally for cattle fodder

Vicia auriculata, Cass Buffaloes are said to be fond of this plant

Vigna Catiang, Endl VERN *Lobiya* The leaves and stems are sometimes used as cattle fodder In Mysore the straw is said to be useful only as manure

V pilosa, Baker The straw of this plant is said to be used as a cattle fodder

V vexillata, Benth Cattle eat the plant in Chutia Nagpur (*Rev A Campbell*)

Vitex leucoseylon, Linn f Buffaloes eat the leaves in the Central Provinces (*R Thompson*)

Wendlandia exserta, DC Cattle eat the leaves (*R Thompson*)

Woodfordia floribunda, Salisb Cattle eat the leaves in Chutia Nagpur (*Rev A Campbell*)

Wrightia tinctoria, R M Leaves eaten by buffaloes and other cattle in the Jeypore State (*Bhai Sadhu Singh*) and by buffaloes in the Central Provinces (*R Thompson*)

W tomentosa, R & S Cattle eat the leaves in Chutia Nagpur (*Rev A Campbell*) Leaves eaten by buffaloes in Central Provinces (*R Thompson*)

Xylia dolabriformis, Benth Buffaloes eat the leaves in the Central Provinces (*R Thompson*)

Zizyphus Jujuba, Lamk VERN *Ber* The leaves are much valued as cattle fodder

Z nummularia, W & A VERN *Fharberi* Cattle are largely fed on the leaves of this bush in many parts of India and it is often a most useful stand by when other sources of fodder fail

Z rugosa, Lamk Cattle eat the leaves in Chutia Nagpur (*Rev A Campbell*)

Z xylopyra, Willd VERN *Katber* The young shoots, leaves and fruit serve as fodder for cattle (*Brandis*)

II INDIAN FODDER GRASS—EXCLUDING HIMÁLAYAN SPECIES

Æliuropus littoralis, Parl var *repens* Sandy and saline tracts in the Western Panjáb resembling *dub* (*Cynodon Dactylon*) which it replaces

Alopecurus pratensis, Linn (Meadow Fox tail) A common European grass occurring also on the Himálaya and descending to the Panjáb plains Abundant at Quetta where it is largely used for feeding horses Might be cultivated with advantage as a winter grass in many parts of the Panjáb

Andropogon annulatus, Forsk An abundant and excellent fodder grass A variety with the outer glumes 3 toothed *A Bladhui*, Retz is also plentiful

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Food and Fodder	(F F Duthie)	FODDER.
<p>Andropogon caricosus, <i>Linn</i> Plentiful in Bundelkhand and the Central Provinces and largely used as fodder</p>		
<p>A foveolatus, <i>Del</i> Abundant on sandy and stony ground, and generally considered to be a good fodder grass</p>		
<p>A Ischaemum, <i>Linn</i> A good fodder grass resembling A annulatus, but less abundant</p>		
<p>A laniger, <i>Desf</i> Common in North Western India Cattle eat this grass readily when it is young and tender but horses are liable to suffer from colic after feeding on it It is strongly aromatic, and the scent is often communicated to the milk of cows</p>		
<p>A mucranthus, <i>Kunth</i> var villosulus (<i>Hack Mongr</i> 490) On Mount Abu where it is called <i>Ballak</i> and is much valued for fodder It occurs also on the Himálaya</p>		
<p>A muricatus, <i>Rets</i> (A squarrosus <i>Linn f</i> in <i>Hack Mongr</i> 542) This is the <i>khas khas</i> grass the roots of which are employed in making tattles It thrives best on damp low lying land where when young it affords abundance of fodder for buffaloes and in seasons of excessive drought it is cut and given to cattle</p>		
<p>A pachyarthrus, <i>Hack</i> Common in Central India on black soil also on saline and sandy tracts A good grass for cattle but not for horses</p>		
<p>A pertusus, <i>Willd</i> <i>VERN Palwa</i> An excellent grass for grazing and stacking and very abundant</p>		
<p>A Schoenanthus, <i>Linn</i> A sweet scented species abundant in Northern and Central India Although largely used as fodder it is not considered very wholesome In Rajputana it usually forms the roofing portion of the stacked hay The essential oil <i>rusi ka tel</i> is supposed to exercise a preservative action when this grass is stacked with others</p>		
<p>A serratus <i>Thunb</i> var nitidus (<i>Hack Mongr</i>) = Sorghum muticum, (<i>Nees</i>) Hilly parts of India occasionally used for fodder</p>		
<p>Anthistiria anathera, <i>Nees</i> (Themeda anathera <i>Hack</i>) Abundant on the Himálaya and descending to the Panjáb plains According to Captain Wingate it is much liked by the horses of the British cavalry and artillery at Rawal Pindi</p>		
<p>A ciliata, <i>Linn f</i> (Themeda ciliata, <i>Hack</i>) Common in hilly parts of India and on the Himálaya Though rather a coarse grass it is much used for fodder in Central India</p>		
<p>Apluda aristata, <i>Linn</i> (A varia <i>Hack</i> var aristata) Abundant in India amongst bushes and in forest land often forms a large portion of the undergrowth Considered to be good fodder when young</p>		
<p>Aristida depressa, <i>Rets</i> Abundant on sandy and stony ground where it affords good grazing when young</p>		
<p>A hystrix <i>Linn f</i> Met with in similar situations and probably of equal value</p>		
<p>Arthraxon lanceolatus <i>Hochst</i> (Andropogon lanceolatus, <i>Roxb</i>) Common on rocky ground and said to be a good fodder grass in Rajputana</p>		
<p>Avena sativa, <i>Linn</i> (<i>Oats</i>) First rate fodder, both green and as hay especially for horses</p>		
<p>Bambusa arundinacea, <i>Rets</i> A favourite fodder of elephants The leaves are given to horses as a medicine</p>		
<p>Bromus unioloides, <i>H B & K</i> (<i>Prairie grass of Australia</i>) Much valued both in Australia and America as a nutritious fodder grass whether green or dry Has been tried in India, but as a crop was found inferior to oats</p>		
<p>Cenchrus catharticus <i>Del</i> <i>VERN Bhurt</i> A characteristic desert grass and much valued for grazing purposes on account of the early appearance of its foliage</p>		

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- Cenchrus montanus* *Nees* VERN *Anjan* Flourishes on sandy soils Very good for grazing and makes excellent hay
- C. pennisetiformis*, *Hochst & Steud* A tall succulent grass growing in bushy places and often assuming a climbing habit
- Chloris barbata*, *Swartz* Considered good for cattle up to the time of flowering
- C. digitata*, *Steud* Amongst bushes and under the shade of trees Is used as fodder in Rájputana
- C. tenella*, *Roxb* Said to be a good fodder grass in Rájputana
- C. tetrastrachys*, *Hack MS* Apparently confined to the saline usar tracts of the North Western Provinces, where over considerable areas it constitutes the only vegetation
- Chrysopogon serrulatus*, *Trin* (*Andropogon Trinu*, *Steud* in *Hack Monogr*) Common in hilly parts of India a very good fodder grass and much liked by horses
- Coix lachryma*, *Linn* Largely eaten by cattle in Oudh, and said to be very fattening
- Cynodon Dactylon*, *Pers* VERN *Dub* Universally recognised to be the most nutritious and useful fodder grass in this country, whether green or dry especially for horses
- Dendrocalamus strictus*, *Nees* Affords abundant fodder for elephants
- Dinebra arabica*, *Beauv* Plentiful in Central India on cultivated ground
- Diplachne fusca*, *Beauv* Common on low lying ground especially where the soil is saline Buffaloes appear to be very fond of it
- Eileusine ægyptiaca*, *Pers* VERN *Makra* A common grass especially on cultivated ground Said to be very good for cattle but not for horses
- E. Coracana*, *Gertn* VERN *Mandua* or *ragi* Cultivated as a grain crop in most parts of India and largely so in Mysore where it affords abundance of fodder both green and as straw *Ragi* straw is there considered to be the best fodder for cattle which are said to work and thrive on it alone without requiring grass Horses also are sometimes fed on it when grass is scarce It is said to improve by keeping
- E. flagellifera*, *Nees* VERN *Chhumbar* A nutritious perennial species resembling *dub* common on sandy ground In Bikanir it is said to be the best grass for cattle and sheep
- E. indica*, *Gertn* Rather a coarse grass though liked both by horses and cattle
- E. scindica*, *Duthie* Like a slender form of *makra* Said to be a good fodder grass Found on sandy ground
- E. verticillata*, *Roxb* Considered to be a good fodder grass in the Panjáb and Rájputana
- Elionurus hirsutus*, *Munro* (*Rottboellia hirsuta*, *Vahl* in *Hack Monogr*) A characteristic desert grass affording excellent grazing when young Said to be liked by elephants
- Eragrostis abyssinica* Introduced from Abyssinia where it is grown as a cereal under the name of *Teff* Affords excellent green fodder
- E. bifaria* *W & A* Common on sandy and rocky ground Eaten by cattle in Rájputana
- E. Brownei*, *Nees* Wet ground Valued as fodder in Australia
- E. ciliaris* *Link* Sandy ground good for grazing
- E. cynosuroides*, *R & S* VERN *Dáb* A coarse deeply rooting grass frequent on low lying waste lands It is much liked by buffaloes
- E. elegantula*, *Nees* Frequent on wet ground Eaten by cattle
- E. megastachya*, *Link* Used as fodder
- E. nutans* *Nees* Plentiful on damp clay soils Cattle readily eat it when other grasses fail

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<p><i>Eragrostis pilosa</i>, Beauv Relished by buffaloes</p> <p><i>E plumosa</i>, Link A fairly good fodder grass varying according to the soil A dwarf variety with denser flowering spikes is abundant on sandy and saline tracts</p> <p><i>E tenella</i>, Beauv Common on cultivated ground It is eaten by cattle both when fresh and as hay and the seeds which it bears in profusion are said to render it all the more nutritious</p> <p><i>Eriochloa annulata</i> Kunth Grows in wet places In Australia it is said to be much relished by stock</p> <p><i>Euchlœna luxurians</i> Ascher (<i>Teosinte</i>) A native of Guatemala A quick growing nutritious annual but too expensive to cultivate for fodder on a large scale</p> <p><i>Hemarthra compressa</i>, Kunth (<i>Rottboellia compressa</i> Linn f in <i>Hack Monogr</i>) Cattle are fond of this grass Is said to be highly esteemed in Australia for moist pastures</p> <p><i>Heteropogon contortus</i>, R & S (Spear grass) (<i>Andropogon contortus</i> Linn in <i>Hack Monogr</i>) Common all over India and up to 7000 feet on the Himâlaya I largely used as fodder when young and after the spears have fallen In Râjputana and Bundelkhund it is regularly stacked after the rains are over In Australia it is considered to be a splendid grass for a cattle run</p> <p><i>Hordeum vulgare</i> Linn (Barley) The grain is often given to horses and also to cattle when gram is scarce The <i>dhuss</i> or broken up straw is considered to be a good fodder but inferior to that of wheat</p> <p><i>Hygrophiza aristata</i> Nees A jhil grass and usually found floating on the surface of the water Roxburgh says that cattle are fond of it</p> <p><i>Imperata arundinacea</i> Cyrill When young it is relished by cattle especially after being fired This grass forms the greater portion of the pasturage in Bengal</p> <p><i>Isachne australis</i> R Br Horses and cattle are said to be fond of this grass It is found usually on wet ground</p> <p><i>Ischaemum angustifolium</i> Hack (<i>Pollinia eriopoda</i>, Hance) VERN <i>Bhâbar</i> Eaten by cattle when young</p> <p><i>I ciliare</i> Retz Common in Central India, and occasionally used as a fodder grass</p> <p><i>I laxum</i>, R Br VERN <i>Sairan</i> (Râjputana) <i>Sira</i> (C Prov) Abundant in Râjputana and the Central Provinces where it is much valued for fodder</p> <p><i>I pilosum</i> Hack A common black soil grass and considered to be good for fodder</p> <p><i>I rugosum</i> Salisb Found on wet ground and in paddy fields and in its young state is hardly distinguishable from rice Cattle and horses eat it when young</p> <p><i>Isellema laxum</i> Hack Common in Northern and Central India, usually on low lying land It is also a characteristic black soil grass and in Bundelkhund, where it is called <i>musel</i> it is greatly prized for fodder Buffaloes are very fond of it</p> <p><i>I Wightii</i>, Anders Associated with the preceding and apparently not recognized by the natives as distinct</p> <p><i>Koeleria phleoides</i>, Pers A common Mediterranean grass extending through Afghanistan to the Panjâb Dr Aitchison recommends its cultivation in Northern India as a winter fodder grass</p> <p><i>Leptochloa chinensis</i>, Nees Used more or less for fodder</p> <p><i>Lolium perenne</i>, Linn (Perennial Rye grass) A well known and very important fodder grass in Europe would probably thrive in the Panjâb as a cold weather crop It is found wild on the Himâlaya</p>		<p>II INDIAN FODDER GRASS.</p>

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Manisuris granularis, *Swartz* According to Coldstream it is prized and stacked at Hissar but is not much relished by cattle, though at Ajmere it is considered to be a good fodder grass

Melanocenchris Royleana, *Nees* Common on sandy ground and said to afford good grazing when young It is however too small to be of much account

Ophiurus corymbosus, *Gertn* A common black soil grass eaten by cattle when young or when other grasses fail

O perforatus, *Linn* Found on low lying pastures Cattle eat it when it is young and green

Oplismenus Burmanni, *Retz* Found usually in shady places Cattle eat it when young and it is said to make good hay

Oryza sativa *Linn* (Rice) Rice straw is the chief fodder in the Madras Presidency and is stacked in every district It is usually kept for a few months to season and will remain good for three years It is also very largely used as fodder in Bengal and parts of the Bombay Presidency In Northern India it is less valued The young shoots after the rice has been harvested afford good pasturage for sheep in the Ratnagiri district The husks mixed with oilcake are sometimes given to buffaloes In Burma and Manipur unhusked rice is frequently given to horses

Panicum antidotale *Retz* *VERN* *Ghamur* A tall coarse-looking grass found in clumps and often associated with other herbage which like itself seeks shelter under prickly bushes Wingate says that more than three fourths of the grass growing in the Changa Manga plantation consists of this species and that the natives feed their cattle on the green fodder In the Sirsa Settlement Report it is stated that cattle are apt to be poisoned if they eat it green At Hissar however according to Coldstream it is grazed only when young as it afterwards acquires a bitter and saltish taste

P colonum, *Linn* *VERN* *Sawank* A common weed on cultivated land Is greedily eaten by all kinds of cattle both before and after it has flowered the abundant crop of grain yielded by it adding materially to its nutritive value Aitchison says that it is sometimes cultivated at Jhelum

P Crus Galu, *Linn* *VERN* *Sunwak* A coarser plant than the preceding and usually found near water Is said to be cultivated in the Lahore district Cattle especially buffaloes are fond of it In America where it is known as Barn yard grass, it is said to be much liked by horses both when green and dry

P distachyum, *Linn* Common in Northern India In Australia this species is grown for hay and is said to be an immense yielder

P eruceforme, *Sibth & Sm* Common on black and sandy soils in Bundelkhand and Central India especially on cultivated ground Yields an abundance of grain

P flavidum, *Retz* Plentiful in the plains and much liked by cattle and horses It yields an abundance of grain which contains twice as much oil or fat as that of any other species examined by Professor A H Church

P fluitans *Retz* A water grass An abundant grain yielder

P frumentaceum, *Roxb* *VERN* *Sanwan* Grown as a rainy season crop chiefly for its grain, but occasionally for fodder The straw is a good fodder and is much used in parts of Mysore and in the Madras Presidency though ranked below that of *ragi* and rice

P helopus, *Trin* *VERN* *Kurl* Considered to be a very good fodder grass for horses and cattle It is a common weed of cultivated ground in the plains, and is found also on the Himalaya at moderate elevations

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Panicum humile , <i>Nees</i> Common in Central India where it is used as fodder		II INDIAN FODDER GRASS
P. jumentorum , <i>Pers</i> (Guinea Grass) A very valuable fodder plant easily cultivated in the plains and capable of yielding seven or eight cuttings during the year under irrigation. A single cutting will yield as much as 180 maunds of green fodder. All kinds of stock will thrive on it.		
P. miliaceum , <i>Linn</i> VERN <i>Chena</i> Yields excellent green fodder and is largely grown for this purpose in some districts of the Panjáb. In parts of Mysore the straw is considered better fodder than that of rice.		
P. miliare , <i>Lamk</i> VERN <i>Kutki</i> A small kind of millet grown largely by the poorer classes in Central and South India on inferior soils. Cattle are fond of the straw.		
P. Petiveri , <i>Trin</i> A fairly good fodder grass but said to be unsuited for hay.		
P. prostratum , <i>Lamk</i> A good fodder grass and a heavy seed yielder.		
P. polipodium , <i>Trin</i> VERN <i>Mishri</i> Resembles <i>Kutki</i> (P. miliare) and is cultivated and utilised in the same manner.		
P. repens , <i>Linn</i> A perennial glaucous species occurring in swampy ground. Both Roxburgh and Royle state that cattle are fond of this grass.		
P. sanguinale , <i>Linn</i> VERN <i>Takri</i> Common all over the plains and up to moderate elevations on the Himálaya. It is largely used as fodder. In America it is known as Crab grass and is much valued for pasture as well as hay. A variety with hairy glumes (P. ciliare Retz) is also common particularly on dry sandy soils and is largely used for fodder.		
Paspalum Kora , <i>Willd</i> Common on wet ground and eaten by buffaloes.		
P. scrobiculatum , <i>Linn</i> VERN <i>Koda</i> A rainy season crop yielding a coarse kind of grain used mostly by the poorer classes of people. Cattle should be prevented straying into the fields when this crop is ripening as the grain until it has been washed several times is most unwholesome. The straw is sometimes given to cattle.		
Pennisetum cenchroides , <i>Rich</i> VERN <i>Dhāman</i> or <i>anjan</i> A most excellent fodder grass thriving best where the soil is sandy. In the Multan district it is considered to be the best grass to give to milch cows. Would probably repay cultivation.		
P. typhoides , <i>Rich</i> VERN <i>Bajra</i> The chopped stalks are considered a good fodder in many parts of India though inferior to <i>judr</i> . In some districts the stalks are left standing after the heads have been removed and are eaten by cattle. In Káthiawár <i>bajra</i> grain is thought better for horses than gram.		
Phragmites communis , <i>Trin</i> According to Aitchison this grass is largely collected in Afghanistan for fodder.		
Poa annua , <i>Linn</i> A common weed of irrigated ground in West Panjáb and Beluchistan abundant also on the Himálaya. The foliage is very nutritious though scanty.		
Pollinia argentea , <i>Trin</i> A characteristic black soil grass. Affords excellent fodder for cattle when young.		
Saccharum ciliare , <i>Anders</i> VERN <i>Munj</i> The young shoots are eaten by cattle in the Panjáb and are regarded as good fodder for milch cows.		
S. officinarum , <i>Linn</i> (Sugarcane) The green tops and the stalks when juicy are sometimes given to cattle.		
S. spontaneum , <i>Linn</i> VERN <i>Káns</i> A tall coarse grass abundant by the sides of rivers and on low lying ground. It is much relished by buffaloes, and when young is given to elephants. In the Rohtak district of the Panjáb it is considered good fodder for horses.		

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Setaria glauca, Beauv VERN *Bandra* Very common especially in damp ground A moderately good fodder but unsuited for hay

S italica, Beauv VERN *Kangni* Cultivated for its grain In parts of Mysore the straw is reckoned as next in quality to that of *ragi*. In the Montgomery district the *bhusa* is considered a strengthening food It is known in the United States as "Hungarian grass" and is much valued as forage also in Australia

S verticillata, Beauv A coarse grass common in shady places Cattle eat it when young

Sorghum halepense Pers (*Andropogon Sorghum Brot* var *halepensis* in *Hack Monogr*) VERN *Baru* Said to be good for grazing and for hay, but not considered wholesome until after the rains are over Opinions however are at variance on this point In Australia it is much valued for pasturage and hay also in the United States where it is called 'Johnson grass'

S saccharatum, Pers (*Andropogon Sorghum, Brot* var *saccharatus* in *Hack Monogr*) Two varieties were introduced into India about 30 years ago one called *Sorgho* from China and the other from Africa called *Imphi*. *Sorgho* has taller stems and looser panicles of flowers It is cultivated in tropical countries for its grain and in temperate regions for fodder and sugar The Chinese grow it chiefly for making alcohol As a fodder plant it is greatly valued It was first tried in India in 1858 and the result of the experiment showed that though it could not be compared with the ordinary sugarcane of the country as a sugar yielder it would prove of great value as a forage plant Subsequent trials undertaken chiefly in South India have confirmed this opinion The Chief Commissioner of Mysore in his report for 1871 observes —

With respect to the value of *Sorgho* as an article of fodder there appears to be no doubt that it will grow fairly in this province as a dry crop on land not irrigated during the rainy season and that if cut for fodder before seeding it is well suited for cattle especially milch cows their milk being enriched to an extraordinary degree by its use in small quantities Mr Phillips experiments with *Sorgho* at Allahabad in the years 1872 1873 1874 gave some wonderful results in the way of yield and profit The United States Agricultural Department has declared that the value of *Sorgho* for feeding stock cannot be surpassed by any other crop as a greater amount of nutritious fodder can be obtained from it in a shorter time within a given space and more cheaply The African *Imphi* is a smaller plant and though on this account less profitable as a crop it appears to be equally nutritious

S vulgare, Pers (*Andropogon Sorghum, Brot* in *Hack Monogr*) VERN *Juar* Yields excellent fodder green or dry which is largely used in various parts of India It is often specially grown as a fodder crop under the name of *chari*, in which case it is sown earlier and more thickly than when cultivated for the grain The stalks of certain juicy varieties afford valuable feeding for milch cattle The chopped up straw (*karbi*) is much used as cattle food in Northern India. In the Madras Presidency the straw is less valued than that of *ragi* but is considered superior to that of rice.

Sporobolus diander Beauv Said to be eaten by horses and cattle

S indicus R Br A good pasture grass for horses, also given as fodder when young

S pallidus, Nees VERN *Palengi* A gregarious species common in moist sandy ground and affording a considerable amount of forage A variety called *kálusra* constitutes the greater part of the grass vege-

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<p>tation of the <i>usar</i> tracts in the North Western Provinces, and is always a sure indication of the presence of <i>reh</i> salts</p> <p>Tetrapogon tetrastachys, <i>Hack (MS)</i> A characteristic <i>usar</i> grass accompanying <i>Sporobolus pallidus</i>, var, and often constituting the entire vegetation</p> <p>T villosus <i>Desf</i> A common Panjáb and Rájputana species said to be a good fodder grass at Ajmere</p> <p>Tragus racemosa <i>Hall</i> Occurs on sandy ground According to Oold stream it is much grazed at Hissar and is very nutritious but is too small to stack</p> <p>Triticum sativum, <i>Lamk</i> (Wheat) In Northern India green wheat is largely used as fodder In the Jhang district sheep and goats are allowed to graze on the wheat crops once in order to strengthen the stalks and prevent their being laid by wind The straw is often given as fodder but in Mysore it is said to cause distemper The chaff or <i>bhusa</i> is a well known form of food It is sometimes mixed with gram chaff to render it more wholesome</p> <p>Zea Mays <i>Linn</i> (Maize or Indian Corn) Often given as green fodder or dried and mixed with other green fodder</p>	<p>II INDIAN FODDER GRASS</p>
<p>III HIMALAYAN FODDER PLANTS—EXCLUDING GRASSES</p> <p>The following trees shrubs and herbs have been recorded as affording food or fodder for cattle sheep and goats on the Himálayan Ranges The fodder yielding trees of the tropical and temperate zones of India are often severely lopped for the supply of winter fodder to village cattle especially those of tracts within the region of snowfall The vegetation of the Alpine tracts form irregular belts above the limits of the upper forests and chiefly consists of grass herbage which becomes available for cattle and sheep, during the summer months The majority of the grasses found on these elevated pastures belong to European genera and many of the species are even botanically identical with those which constitute the finest pasture lands of Great Britain and the Continent of Europe</p> <p>Abelia triflora, <i>R Br</i> CAPRIFOLIACEÆ Temperate region Browsed by goats</p> <p>Abies Webbiana, <i>Lindl</i> CONIFERÆ Temperate region On the Panjáb Himálaya the twigs and leaves are cut and stored for use in winter</p> <p>Acer pictum <i>Thunb</i> and A villosum, <i>Wall</i> SAPINDACEÆ Temperate region The branches are lopped for fodder</p> <p>Achillea millefolium, <i>Linn</i> COMPOSITÆ Temperate and Alpine regions A perennial herb affording excellent fodder for sheep</p> <p>Æsculus indica, <i>Colebr</i> SAPINDACEÆ Temperate region The foliage is largely used as fodder for cattle and is sometimes stored for winter use Cattle and goats feed on the nuts and these latter are ground and given to horses and mules</p> <p>Allardia glabra <i>Dcne</i> COMPOSITÆ Alpine region A perennial herb, browsed by sheep and goats</p> <p>Alnus nitida, <i>Endl</i> CUPULIFERÆ Temperate region The leaves are used as fodder</p> <p>Aralia cachemirica, <i>Dcne</i> ARALIACEÆ Temperate region The leaves of this shrub are eaten by goats</p> <p>Artemisia parviflora, <i>Roxb</i> COMPOSITÆ Temperate region A perennial herb browsed by sheep and goats</p> <p>A. sacrorum, <i>Ledeb</i> Temperate and Alpine region Eaten by sheep</p> <p>Astragalus multiceps, <i>Wall</i> LEGUMINOSÆ Temperate and Alpine regions A shrub occasionally eaten by cattle</p>	<p>III HIMALAYAN FODDER PLANTS. 673</p>

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- Bauhinia variegata*, Linn LEGUMINOSÆ Tropical region The leaves are eaten by cattle
- Betula utilis*, Don SYN — *B Bhojpattra*, Wall CUPULIFERÆ Temperate and Alpine regions Lopped for cattle fodder
- Buxus sempervirens*, Linn EUPHORBIACEÆ Temperate region Eaten sparingly by goats poisonous to other animals
- Caragana pygmaea*, DC LEGUMINOSÆ Temperate and Alpine regions A prickly shrub browsed by goats
- Cedrela serrata* Royle MELIACEÆ Tropical and temperate regions The shoots leaves and seeds are given to cattle
- Cedrus Libani*, Barrel var *Deodara* CONIFERÆ Temperate region The shoots and young plants of the deodar are browsed by goats
- Celtis australis* Linn URTICACEÆ Temperate region Planted for shade and fodder and the winter supply of hay is often to be seen stored among its branches
- Cicer soongaricum*, Steph LEGUMINOSÆ Temperate and Alpine regions An annual said to be very fattening for cattle
- Colebrookia oppositifolia* Smith LABIATÆ Tropical region Buffaloes eat the leaves of this shrub
- Coriaria nepalensis*, Wall CORIARÆ Temperate region Sheep browse on this shrub
- Cornus capitata*, Wall CORNACEÆ Temperate region Eaten by cattle goats and sheep
- C macrophylla*, Wall Temperate region The leaves are eaten by goats
- Cotoneaster acuminata*, Lindl ROSACEÆ Temperate region Cattle goats and sheep eat the leaves
- Crataegus crenulata*, Roxb ROSACEÆ Temperate region Sheep and goats eat the leaves of this shrub
- Debregeasia hypoleuca*, Wedd URTICACEÆ Tropical region Sheep browse on this shrub
- Desmodium tiliaefolium*, G Don LEGUMINOSÆ Temperate region Cattle feed on this shrub
- D triflorum*, DC Tropical region According to Roxburgh cattle are very fond of this herb Mueller, in his *Select Plants 7th Ed* p 132 alludes to this species as recommendable for places too hot for ordinary clover and as representing a large genus of plants many of which may prove of value for pasture Doubtless several other Himálayan species will be found capable of affording nutritious fodder
- Dolichos biflorus*, Linn (*Kulthi* or *Kulath*) LEGUMINOSÆ Tropical region A cultivated rainy season crop The straw is given to cattle
- D Lablab*, Linn Tropical region Cultivated The stalks and leaves are excellent fodder for cattle
- Dracocephalum heterophyllum*, Benth LABIATÆ Alpine region This herb is browsed by sheep and goats
- Eleagnus latifolia*, Linn ELÆAGNACEÆ Tropical and temperate regions The leaves are used as fodder in Jaunsár
- E umbellata*, Thunb Temperate region The leaves are used as fodder
- Engelhardtia Colebrookiana* Lindl JUGLANDÆ Temperate region Cattle and goats eat the leaves
- Ephedra vulgaris*, Rich GNETACEÆ Temperate and Alpine regions This shrub is browsed by goats
- Eruca sativa*, Lamk CRUCIFERÆ Cultivated in tropical and temperate regions. Often given as green fodder
- Euonymus alberatus*, Wall CELASTRINEÆ Temperate region Young shoots and leaves lopped for goats

Food and Fodder	(F F Duthie)	FODDER
Euonymus Hamiltonianus , Wall Temperate region Young shoots and leaves lopped for cattle.		III. HIMALAYAN FODDER PLANTS
Ficus foveolata , Wall URTICACEÆ Tropical and temperate regions Browsed by goats		
F hispida , Linn Tropical region Lopped for cattle fodder		
F nemoralis , Wall Tropical and temperate regions Used as cattle fodder		
F palmata , Forsk Tropical region Used as cattle fodder		
F religiosa Linn Tropical region A favourite fodder of elephants		
F Roxburghii , Wall Tropical region The leaves are valued as fodder for cattle and elephants		
F Rumphii , Blume SYN F cordifolia , Roxb Tropical region The leaves are eaten by cattle goats and elephants		
F saemocarpa , Miq Tropical region The leaves of this shrub are used to feed cattle (Madden)		
Fraxinus xanthoxyloides Wall OLEACEÆ Temperate region Much lopped for sheep and goats		
Glycine Soja Sieb & Zucc LEGUMINOSÆ Cultivated in the tropical region under the name of <i>bhat</i> The stems and leaves afford excellent fodder for all kinds of stock [The cultivated plant may be G hispida , Maxim Ed.]		
Grewia laevigata , Vahl TILIACEÆ Tropical region Lopped for cattle		
G oppositifolia Roxb Tropical and temperate regions The leaves and twigs are stored as winter fodder for sheep and goats		
G tiliaefolia Vahl and G vestita , Wall Tropical region Both these trees are lopped for fodder		
Hedera Helix Linn ARALIACEÆ Tropical and temperate regions Goats are fond of ivy leaves		
Heracleum sp UMBELLIFERÆ Temperate region Collected in Bissahir and Chamba as winter fodder for goats		
Hiptage Madablota , Gærtn MALPIGHIACEÆ Tropical region This climbing shrub is said to afford very good fodder		
Holmskioldia sanguinea , Retz VERBENACEÆ Tropical region Eaten by sheep and goats		
Holoptelea integrifolia , Planch URTICACEÆ SYN— Ulmus integrifolia Roxb Tropical region Yields fodder for cattle		
Hymenodictyon excelsum Wall RUBIACEÆ Tropical region The leaves are given to cattle as fodder		
Ilex dipyrena , Wall ILCINÆ Temperate region The leaves are sometimes given to sheep		
Indigofera pulchella , Roxb LEGUMINOSÆ Tropical and temperate regions Eaten by cattle and goats		
Iris , sp IRIDACEÆ Alpine region The leaves are used as fodder in Ladak		
Juglans regia , Linn JUGLANDEÆ Temperate region The twigs and leaves of the walnut mixed with hay are often stored in the boughs of trees for winter use		
Limnanthemum nymphaeoides Link GENTIANACEÆ This aquatic herb is largely used as fodder in Kashmir and is said to increase the milk of cows feeding on it		
Lonicera hypoleuca Dcne CAPRIFOLIACEÆ Temperate region Goats are said to fatten on the leaves of this shrub		
L. quinquelocularis , Hardw Temperate region The leaves of this shrub are used as cattle fodder		
Lotus corniculatus , Linn (Bird's foot Trefoil) LEGUMINOSÆ Temperate region Valued for grazing and for hay in Europe and Australia.		

FOOD &

Food and Fodder

III
HIMALAYAN
FODDER
PLANTS

- Marlea begoniifolia* Roxb CORNACEÆ Tropical and temperate regions
The leaves are collected for sheep fodder
- Medicago falcata*, Linn LEGUMINOSÆ Wild and cultivated on the Western Himálaya
- M sativa*, Linn Lucerne is cultivated to a small extent at most of the Himálayan stations as green fodder for horses
- Morus serrata*, Roxb URTICACEÆ Temperate region The branches are lopped for cattle fodder
- Myricaria elegans*, Royle and *M germanica*, Desr TAMARISCINÆ Temperate and Alpine regions Sheep are said to browse on these shrubs
- Olea cuspidata*, Wall OLEACEÆ Tropical and temperate regions The leaves are bitter and are considered to be one of the best kinds of fodder for goats and sheep Also said to be good for cows and milch buffaloes both increasing the quantity and improving the quality of their milk
- O glandulifera*, Wall Tropical and temperate regions The leaves are eaten by cattle sheep and goats
- Otostegia limbata*, Benth LABIATÆ Tropical region Goats are said to browse on this bush on the Panjáb Himálaya
- Ougeina dalbergioides* Benth LEGUMINOSÆ Tropical region The branches are lopped as fodder for cattle and sometimes for elephants
- Oxalis corniculata*, Linn GERANIACEÆ A common weed in the tropical and temperate regions Cattle sheep and goats eat the plant
- Oxybaphus himalaicus* Edgew NYCTAGINÆ Dry temperate region This herb is collected for winter fodder
- Oxytropis microphylla* DC LEGUMINOSÆ Alpine region Sheep and yaks are said to browse on this perennial herb
- Phaseolus aconitifolius*, Jacq LEGUMINOSÆ (VERN *Moth*) This, as well as *mung* (*P Mungo*), *urd* (*P radiatus*), and *P trilobus*, are cultivated to some extent by the villagers in the warmer regions of the Himálaya and as in other parts of India, the leaves stems and chaff are available as cattle food
- Physochlaina præalta*, Hook f SOLANACEÆ Dry Alpine region Used as cattle fodder in Lahoul
- Picea Morinda*, Link SYN — *Abies Smithiana*, Forbes CONIFERÆ Himálayan Spruce Temperate region Affords fodder for sheep and goats
- Picrasma quassioides* Benn SIMARUBÆ Tropical and temperate regions The leaves are eaten by sheep and goats
- Pistacia integerrima* Stewart ANACARDIACEÆ Tropical and temperate regions The twigs and leaves are a favourite food of buffaloes and camels
- Pisum sativum* Linn LEGUMINOSÆ The common pea is cultivated on the Western Himálaya up to 13000 feet at the higher elevations it does not ripen its seed and is then used as fodder
- Polygonum aviculare* Linn POLYGONACEÆ Temperate region Sheep and goats are said to fatten when fed on this plant
- P chinense*, Linn Tropical and temperate regions Cattle are fond of this species Many other kinds of *Polygonum* are found at various elevations on the Himálaya and are used more or less as fodder
- Populus balsamifera*, Linn SALICINÆ Inner ranges of Western Himálaya The branches are often lopped for cattle fodder
- P ciliata*, Wall Temperate region Affords fodder for goats
- P nigra*, Linn (Lombardy Poplar) Is cultivated in the temperate regions of the Western Himálaya and the branches are often lopped for cattle fodder

Food and Fodder	(7 F Duthse)	FODDER
<p>Potamogeton crispus <i>Linn</i> NAIDACEÆ This aquatic plant is said to be used as fodder in Ladák P gramineus, P lucens, and P natans, are similarly used in other parts</p> <p>Potentilla fruticosa, <i>Linn</i> ROSACEÆ Temperate and Alpine regions This shrub is browsed by sheep</p> <p>P Salessovi <i>Steph</i> Dry Alpine region Is browsed by sheep</p> <p>Prunus Padus, <i>Linn</i> ROSACEÆ (Bird cherry) Temperate region Yields excellent fodder for cattle</p> <p>Pueraria tuberosa, <i>DC</i> LEGUMINOSÆ Tropical region The leaves are considered to be very good fodder for horses The tubers chopped up are also sometimes given</p> <p>Pyrus Pashia, <i>Ham</i> ROSACEÆ Tropical and temperate regions Cattle and goats eat the leaves</p> <p>Quercus dilatata <i>Lindl</i> CUPULIFERÆ Temperate region The leaves are prized for feeding sheep and goats</p> <p>Q Ilex <i>Linn</i> Temperate region The leaves are stored for winter fodder</p> <p>Q incana <i>Roxb</i> Temperate region The leaves are given to cattle and sheep</p> <p>Q lanuginosa <i>Don</i> Temperate region The leaves are used as fodder</p> <p>Q semicarpifolia, <i>Smith</i> Temperate region The leaves are stored as winter fodder for cattle</p> <p>Rubia dumetorum <i>Lamk</i> RUBIACEÆ Tropical region The leaves are used as fodder for cattle sheep and goats</p> <p>R uliginosa, <i>DC</i> Tropical region The leaves are browsed by cattle</p> <p>Rhus parviflora <i>Roxb</i> ANACARDIACEÆ Tropical region Cattle and goats eat the leaves</p> <p>Salix acmophylla <i>Boiss</i> SALICINÆ Tropical region The tree is often lopped for cattle fodder</p> <p>S daphnoides <i>Vill</i> Temperate and dry Alpine regions Yields fodder for cattle</p> <p>S. elegans <i>Wall</i> Temperate region Cattle are fond of the leaves</p> <p>S tetrasperma <i>Roxb</i> Tropical and temperate regions This tree is often lopped for cattle fodder</p> <p>Sapindus Mukorossi <i>Gertn</i> SAPINDACEÆ Tropical region The leaves are given to cattle</p> <p>Saurauja napaulensis, <i>DC</i> TERNSTREMIACEÆ Tropical and temperate regions The leaves are lopped for cattle fodder</p> <p>Smithia sensitiva, <i>Ait</i> LEGUMINOSÆ Tropical region A small annual said to make excellent hay</p> <p>Sonchus oleraceus <i>Linn</i> COMPOSITÆ Tropical and temperate regions Cattle are fond of this plant</p> <p>Streblus asper <i>Lour</i> URTICACEÆ Tropical region Lopped extensively for fodder</p> <p>Syringa Emodi, <i>Wall</i> OLEACEÆ Temperate and Alpine regions The leaves are eaten by goats</p> <p>Tanacetum senecionis, <i>Gay</i> COMPOSITÆ Alpine and Western Himalaya Browsed by goats</p> <p>Taxus baccata, <i>Linn</i> CONIFERÆ Temperate region In Europe goats sheep and rabbits eat the leaves of the Yew freely Brandis says that the leaves are considered poisonous but not everywhere, nor under all circumstances</p> <p>Terminalia Chebula, <i>Reta</i> and T tomentosa, <i>Bedd</i> COMBRETACEÆ Tropical region Afford fodder for cattle</p> <p>Trifolium fragiferum, <i>Linn</i> LEGUMINOSÆ Temperate region Used in Kashmir as fodder for cattle</p>		<p>III. HIMALAYAN FODDER PLANTS.</p>

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HIMALAYAN
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PLANTS

- Trifolium pratense* Linn Temperate region Well known in Europe as Red or Broad Clover It grows wild on the Himálaya and is occasionally collected for fodder
- T repens* Linn Dutch or White Clover Temperate and Alpine regions An essential constituent of every good pasture in Europe It is plentiful on the Himálaya as a wild plant
- Tulipa stellata*, Hook LILIACEÆ Tropical and temperate regions The bulbs are eaten by cattle
- Ulmus Wallichiana*, Planch URTICACEÆ Temperate region Lopped extensively for cattle fodder
- Vicia hirsuta*, Koch LEGUMINOSÆ Tropical and temperate regions Occasionally cultivated as a fodder plant under the name of *masur chana* up to 5,000 feet in Kumáun Cattle and goats eat it
- Vigna Catjang*, Endl LEGUMINOSÆ A variety called *Lobiya riansh* is cultivated in the tropical region and affords fodder for cattle
- V vexillata* Benth Temperate region Cattle and goats eat this plant
- Wendlandia exserta* DC RUBIACEÆ Tropical region Cattle eat the leaves
- Woodfordia floribunda* Salisb LYTHRACEÆ Tropical region Cattle and goats eat the leaves
- Wrightia tomentosa* R & S APOCYNACEÆ Tropical region The leaves are eaten by cattle
- Xanthium strumarium*, Linn COMPOSITÆ Tropical region A common weed of cultivated ground Probably introduced from America where it is said that cattle eat the young plants
- Zizyphus oxyphylla* Edgew RHAMNEÆ Tropical and temperate regions Goats are fond of the leaves
- Z xylopyra*, Willd The young shoots leaves and fruit are eaten by cattle and goats

IV
HIMALAYAN
GRASSES
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IV HIMÁLAYAN GRASSES

The gradual changes which determine the character of the Flora at different altitudes on the Himálayan Ranges is well exemplified in the case of grasses As we ascend from the plains the sub-tropical forms are gradually lost sight of other species and genera taking their place On reaching an elevation of about 7 000 or 8 000 feet the majority of the species are found to be characteristic of a temperate climate many European genera such as *Avena*, *Brachypodium*, *Bromus*, *Dactylis*, and *Festuca*, being represented At still higher elevations and up to the limit of melting snow we meet with many species identically the same as occur on the mountains of Europe and America and along the shores of countries within the Arctic region

Although very little is known concerning the nutritive value of Himálayan fodder grasses individually it is nevertheless certain that excellent pasturage is obtainable at every elevation during certain seasons of the year The wide open stretches of grass land (maidáns) extending from the upper limits of the forests towards the snow line constitute the finest feeding grounds for cattle and sheep during the summer months Many of the grasses which flourish in these elevated meadows are known to be highly prized constituents of the best European pastures and with them are found many allied species which analysis would no doubt prove to be equally valuable

A—The following is a list of the more important plains or sub-tropical fodder yielding species which are found at various elevations approaching the temperate region —

Andropogon annulatus, Forsk

F 674

A
SUB TROPICAL
GRASSES
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Food and Fodder	(F F Duthie)	FODDER.
<p> <i>Andropogon intermedius</i>, R Br Var <i>punctata</i>. <i>A. Ischaemum</i> Linn <i>A. Schoenanthus</i>, Linn <i>A. serratus</i>, Thunb (SYN—<i>A. TROPICUS</i> Spreng) <i>A. Trini</i> Steud (SYN—<i>Chrysopogon serrulatus</i> Trin) Largely used as fodder <i>Anthistira ciliata</i>, Linn f <i>Apluda aristata</i> Linn Abundant and largely used as fodder <i>Arthraxon ciliaris</i> Beauv <i>A. echinatus</i>, Hochst <i>A. lanceolatus</i> Hochst <i>A. microphyllus</i> Hochst <i>Arundinella nepalensis</i> Trin Largely represented in the bundles of grass supplied for horses and cows at Simla. <i>A. Wallichii</i> Nees <i>Arundo madagascariensis</i> Kunth <i>A. mauritanica</i>, Desf <i>Chionachne barbata</i>, R Br <i>Chloris digitata</i> Steud <i>Coix lachryma</i>, Linn <i>Cynodon Dactylon</i> Pers (Dub) <i>Eleusine ægyptiaca</i> Pers (Makra) <i>E. Coracana</i>, Gærtn (<i>Mandua</i>) Cultivated <i>E. indica</i>, Gærtn <i>Eragrostis Brownei</i> Nees <i>E. elegantula</i> Nees <i>E. megastachya</i> Link <i>E. pilosa</i>, Beauv <i>E. plumosa</i> Link <i>E. poeoides</i>, Beauv <i>E. tenella</i>, Beauv <i>E. unioloides</i> Nees <i>Heteropogon contortus</i>, R & S (Spear grass) <i>Imperata arundinacea</i> Cyrill <i>Isachne australis</i> R Br <i>Ischaemum rugosum</i> Gærtn <i>Manisuris granularis</i>, Swarts <i>Ophiurus perforatus</i> Trin <i>Oplismenus Burmanni</i> Retz Grows well under the shade of trees <i>Oryza sativa</i>, Linn (Rice) Cultivated <i>Panicum ciliare</i> Retz <i>P. colonum</i> Linn (Sawánk) <i>P. Crus-Galli</i>, Linn <i>P. flavidum</i> Retz <i>P. frumentaceum</i>, Roxb Cultivated <i>P. helopus</i>, Trin (Kurs) <i>P. miliaceum</i>, Linn (<i>Chena</i>) Cultivated up to 11,000 feet It yields very nutritious fodder in the green state <i>P. Petiverii</i> Trin <i>P. psilopodium</i> Trin <i>P. sanguinale</i> Linn (<i>Takria</i>) <i>Paspalum acroculatum</i> Linn (<i>Kodon</i>) Cultivated <i>Pennisetum typhoideum</i>, Rich (<i>Bágra</i>) Cultivated <i>Pogonatherum saccharoideum</i>, Beauv <i>Pollinia argentea</i>, Trin <i>Rottboellia exaltata</i>, Linn f </p>		<p> IV HIMALAYAN GRASSES A SUB-TROPICAL. </p>

FOOD &	Food and Fodder
IV HIMALAYAN GRASSES	<p><i>Saccharum spontaneum</i>, Linn (Káns) <i>Setaria glauca</i> Beauv <i>S intermedia</i>, R & S <i>S italica</i> Beauv (Kangri) Cultivated <i>S verticillata</i> Beauv <i>Sorghum halepense</i> Pers (Baru) <i>Sporobolus diander</i> Beauv <i>S indicus</i>, R Br <i>Zea Mays</i> Linn (Indian Corn) Cultivated</p>
B TEMPERATE	<p>B The names of the species included in the list which follows, are more strictly speaking those of Himálayan grasses excepting a few growing within the temperate region which occur also on the more elevated portions of Central and Southern India. Our knowledge of the grass vegetation of the Himálaya is by no means complete and several species have yet to be determined botanically</p> <p><i>Agropyrum caninum</i>, R & S Alpine region <i>A longiaristatum</i> Boiss Alpine region <i>A semicostatum</i>, Nees Temperate and Alpine regions <i>Agrostis alba</i>, Linn (Fiorin or Creeping Bent grass) Temperate region A variety of this (<i>stolonifera</i>) is a well known fodder grass in Europe and is useful for mixing with other grasses See <i>Sutton's Permanent and Temporary Pastures</i>, p 25 and <i>Stebler and Schroter, Best Forage Plants</i> p 65 (Eng Ed) <i>A ciliata</i>, Trin Alpine region <i>A Hookeriana</i>, Munro Temperate and Alpine regions <i>A pilosula</i>, Trin Temperate region <i>A Roylei</i>, Trin Temperate and Alpine regions <i>Alopecurus pratensis</i>, Linn (Meadow Fox tail Grass) Temperate and Alpine regions One of the best of English pasture grasses See <i>Sutton's Permanent and Temporary Pastures</i>, p 26 <i>Stebler and Schroter Best Forage Plants</i> p 65 (Eng Ed) <i>Andropogon distans</i>, Nees Temperate region <i>A Gryllus</i>, Linn SYN—<i>Chrysopogon Gryllus</i> Trin Sub-tropical and temperate regions <i>A. micranthus</i>, Kunth var <i>villosulus</i> Sub-tropical and temperate regions also on Parasnáth and Mount Abu [Abu <i>A montanus</i>, Roxb Sub tropical and temperate regions also on Mount <i>A Nardus</i>, Linn var <i>exsertus</i> Sub-tropical and temperate regions <i>A tristis</i>, Nees Temperate region <i>Anthusuria anathera</i>, Nees Sub tropical and temperate regions It is much thought of by the hillmen as a good fodder grass <i>Anthoxanthum odoratum</i>, Linn Temperate region Probably introduced A perennial grass thriving in all kinds of soil <i>Arrhaxon submuticus</i>, Nees Sub-tropical region <i>Arundinaria falcata</i>, Nees <i>A Falconeri</i>, Benth & Hk f } Temperate region. <i>A spathiflora</i>, Trin <i>Arundinella setosa</i>, Trin Sub-tropical and temperate regions <i>Avena pratensis</i> Linn (Meadow Oat Grass) Alpine region. Recommended in Europe for dry soils <i>A pubescens</i>, Linn (Downy Oat Grass) Temperate region Grown in Europe for fodder <i>A sativa</i>, Linn (Oats) Cultivated up to the Alpine region <i>A virescens</i>, Nees Alpine region <i>Brachypodium pinnatum</i>, Beauv Temperate region</p>

Food and Fodder	(F F Duthie)	FODDER.
<p><i>Brachypodium sylvaticum</i>, R & S Temperate region</p> <p><i>Briza media</i>, Linn (Quaking grass) Temperate and Alpine regions A familiar ingredient in English pastures especially on a dry soil</p> <p><i>Bromus arvensis</i>, Linn</p> <p><i>B asper</i> Murray Temperate region Recommended in Europe for wooded localities</p> <p><i>B confertus</i> Bieb</p> <p><i>B confinis</i> Nees Temperate and Alpine regions</p> <p><i>B crinitus</i> Boiss Alpine region</p> <p><i>B Danthoniae</i> Trin Temperate and Alpine regions</p> <p><i>B inermis</i> Leyss Temperate region</p> <p><i>B japonicus</i> Thunb Temperate and Alpine regions</p> <p><i>B membranaceus</i> Jacqm Temperate region</p> <p><i>B mollis</i> Linn Temperate and Alpine regions</p> <p><i>B patulus</i> Mert & Koch Alpine region</p> <p><i>B squarrosus</i>, Linn Temperate region</p> <p><i>B tectorum</i> Linn Temperate region</p> <p><i>Calamagrostis nepalensis</i>, Nees Temperate region</p> <p><i>C scabrescens</i>, Griseb var <i>elatior</i>, and var <i>humilis</i> Alpine region</p> <p><i>Dactylis glomerata</i>, Linn (Cock's foot Grass) Temperate region Highly valued in Europe as a fodder grass for cattle. See <i>Suttons Permanent and Temporary Pastures</i> p 34 <i>Stebler and Schröter Best Forage Plants</i> p 30 (Eng Ed)</p> <p><i>Danthonia kashmiriana</i>, Faub & Spach Alpine region Considered by the hill men to be a good fodder grass Some of the Australian species of <i>Danthonia</i> are much valued</p> <p><i>Deschampsia caespitosa</i> Beauv Alpine region</p> <p><i>Elymus dasystachyus</i>, Trin Alpine region</p> <p><i>E nutans</i> Griseb Temperate region</p> <p><i>E sibiricus</i>, Linn Alpine region</p> <p><i>Festuca dura</i> Vill Kashmir</p> <p><i>F elatior</i> Linn Temperate region (Tall Fescue) Much used in Europe for fodder and considered very nutritious See <i>Suttons Permanent and Temporary Pastures</i> p 40</p> <p><i>F filiformis</i>, Jacqm Alpine region</p> <p><i>F gigantea</i>, Vill Temperate region</p> <p><i>F ovina</i>, Hack (Sheep's Fescue) Alpine region Well known in Europe as affording excellent grazing for sheep but unsuitable for hay There are several varieties of which the following are Himalayan — <i>F ovina</i>, Linn the true Sheep's Fescue <i>F duriscula</i>, Linn or Hard Fescue <i>F valesiaca</i>, Schleich and <i>F supina</i>, Hack all occurring within the Alpine region See <i>Suttons Permanent and Temporary Pastures</i>, p 45 <i>Stebler and Schröter Best Forage Plants</i> p 88</p> <p><i>F rubra</i>, Linn (Red or Creeping Fescue) Temperate region Differs from <i>F ovina</i> by its stoloniferous habit and the reddish brown foliage It is cultivated in Europe and is found to stand drought well.</p> <p><i>F scaberrima</i>, Nees Temperate region</p> <p><i>F spadicea</i>, Linn Alpine region</p> <p><i>Garnotia adacendens</i>, Munro MS Temperate region</p> <p><i>Glyceria aquatica</i>, Presl var <i>caspica</i> Temperate region</p> <p><i>G fluitans</i>, R Br (Manna grass) Temperate region</p> <p><i>Graphephorum nutans</i>, Munro Alpine region Evidently a good fodder grass</p> <p><i>Hierochloa laxa</i>, R Br Alpine region It emits during the process of drying a perfume like that of the English hay scented grass <i>Anthoxanthum odoratum</i> <i>H borealis</i> of Western Europe and <i>H redolens</i>,</p>	<p>HIMALAYAN GRASSES B. TEMPERATE</p>	

FOOD &	Food and Fodder
HIMALAYAN GRASSES E. TEMPERATE.	inhabiting the mountains of Australia and New Zealand, have the same properties.
	<i>Hordeum murinaum</i> , Linn Temperate region, descending to the plains in North Western Panjáb
	<i>H pratense</i> , Linn } Alpine region <i>H sylvaticum</i> , Huds }
	<i>H vulgare</i> , Linn (Barley) Cultivated up to the Alpine region There are many varieties including <i>H ægiceras</i> , a beardless kind found in Tibet and Siberian barley (<i>H cæleste</i>) A third variety known in North Kumaun as <i>on jau</i> is cultivated for the manufacture of a strong spirit
	<i>Isachne albens</i> , Trin Temperate region
	<i>Ischaemum Hugeli</i> , Hack Temperate region
	<i>I notatum</i> , Hack Monogr, p 246 Temperate region of East Kumáon
	<i>Koeleria cristata</i> , Pers Temperate region Regarded in Europe as a fairly nutritious grass
	<i>Lolium perenne</i> (Perennial Rye-grass) Alpine region Largely cultivated in Europe and a valuable constituent of the best pasture land There are very many varieties See <i>Suttons Permanent and Temporary Pastures</i> p 49 <i>Stebler and Schroter Best Forage Plants</i> p 20 (Eng Ed)
	<i>L temulentum</i> , Linn (Darnel) Temperate region also occurring as a weed of cultivation in the plains of North Western Panjáb The grain is very liable to become ergotized
	<i>Melica ciliata</i> , Linn Temperate and Alpine regions <i>Mueller</i> says a perennial fodder grass particularly desirable for sheep The following species are also recorded as occurring in the Alpine region — <i>M jacquemontii</i> , <i>Donc</i> <i>M micrantha</i> , <i>Nees</i> , <i>M persica</i> , <i>Kunth</i> <i>M secunda</i> <i>Regel</i> and <i>M vestita</i> , <i>Boiss</i>
	<i>Milium effusum</i> , Linn (Millet Grass) Temperate region It is said to be relished by cattle in Europe and the grain can be used like millet
	<i>Muehlenbergia Hugeli</i> Trin
	<i>M geniculata</i> , <i>Nees</i> <i>M sylvatica</i> , Trin } Temperate region <i>M viridissima</i> , <i>Nees</i> }
	<i>Oplismenus acuminatus</i> , <i>Nees</i> Temperate region
	<i>O compositus</i> , <i>R & S</i> Sub-tropical region
	<i>O undulatifolius</i> , <i>R & S</i> Temperate region
	<i>Oryzopsis paradoxa</i> , <i>Nutt</i> Temperate region Besides the above are four or five other species not satisfactorily determined some of which are found within the Alpine region
	<i>Panicum excurrente</i> , Trin Sub-tropical and temperate regions Foliage like that of <i>P plicatum</i>
	<i>P neurodes</i> , <i>Schult</i> Sub-tropical region
	<i>P vestitum</i> , <i>Nees</i> Sub tropical and temperate regions.
	<i>Paspalum jubatum</i> , <i>Griseb</i> Temperate region
	<i>P minutiflorum</i> , <i>Steud</i> Sub-tropical region
	<i>Pennisetum flaccidum</i> , <i>Griseb</i> Temperate and Alpine regions Often a weed of cultivation at high elevations
	<i>P lanatum</i> , <i>Klotsch</i> Dry temperate region
	<i>P triflorum</i> , <i>Nees</i> Sub-tropical and temperate regions abundant
	<i>Phleum alpinum</i> , Linn (Alpine Catstail) Alpine region
	<i>P arenarium</i> , Linn } Temperate region <i>P asperum</i> , Vill }
	<i>P pratense</i> , Linn (Timothy, or Meadow Catstail) Extensively cultivated in Europe and much valued for pastures on a heavy soil <i>Royle</i> records

Food and Fodder	(F F Duthie)	FODDER
<p>it from the Chor Mountain See <i>Suttons' Permanent and Temporary Pastures</i>, p 58 <i>Stebler and Schroter Best Forage Plants</i>, p 52 (Eng Ed)</p> <p><i>Phragmites communis</i>, Trin On the inner Panjáb Himálaya up to 14 000 feet also in the plains of the North Western Panjáb and Afghánistan where, Dr Aitchison states it is largely collected for fodder</p> <p><i>Poa alpina</i>, Linn (Alpine Meadow grass) Alpine region</p> <p><i>P annua</i>, Linn Sub-tropical and temperate regions reaching the plains in the North Western Panjáb Common in Europe, where it is considered good for early pasturage</p> <p><i>P arctica</i>, Br</p> <p><i>P attenuata</i>, Trin</p> <p><i>P bulbosa</i>, Linn</p> <p><i>P cenisia</i>, All</p> <p><i>P compressa</i>, Linn</p> <p><i>P laxa</i>, Hanke</p> <p><i>P nemoralis</i> Linn</p> <p><i>P pratensis</i>, Linn (Smooth-stalked Meadow Grass) Alpine region</p> <p>This species is much valued in Europe for early hay It is the Blue Kentucky grass of the United States See <i>Suttons Permanent and Temporary Pastures</i> p 60 <i>Stebler and Schroter Best Forage Plants</i> p 72 (Eng Ed)</p> <p><i>P soongarica</i>, Boiss</p> <p><i>P trivialis</i>, Linn (Rough stalked Meadow Grass) Has been found in Western Tibet This grass is valued in Europe for rich moist pastures See <i>Suttons Permanent and Temporary Pastures</i>, p 62 <i>Stebler and Schroter Best Forage Plants</i> p 77 (Eng Ed) There are many other Himalayan species which have not yet been botanically determined</p> <p><i>Pollinia ciliata</i>, Trin Temperate region</p> <p><i>P hirtifolia</i>, Hack Monogr p 165 Temperate region</p> <p><i>P japonica</i>, SYN — <i>Miscanthus sinensis</i>, Anders, in Hack, Monogr p 105 Temperate region</p> <p><i>P Lehmanni</i>, Nees</p> <p><i>P mollis</i>, Hack</p> <p><i>P nepalensis</i> SYN — <i>Miscanthus nepalensis</i> Hack Monogr p 104</p> <p><i>P nuda</i> Trin</p> <p><i>P phaeothrix</i>, Hack Monogr p 168</p> <p><i>P velutina</i>, Hack SYN — <i>Erianthus velutinus</i>, Munro MS</p> <p><i>Polypogon fugax</i>, Nees Sub-tropical and temperate regions in wet ground</p> <p><i>Rottbællia speciosa</i>, Hack SYN — <i>Ischæmum speciosum</i>, Nees <i>Vossia speciosa</i> Temperate region</p> <p><i>Setaria viridis</i>, Beauv Temperate and Alpine regions, usually occurring as a weed of cultivation</p> <p><i>Sporobolus ciliatus</i>, Presl Sub-tropical and temperate regions</p> <p><i>Stipa (Orthoraphum) Roylei</i>, Nees Temperate and Alpine regions</p> <p><i>S sibirica</i>, Lamk Temperate region A poisonous grass, abundant in Kashmír and Hazára, extending east to Kumáon</p> <p><i>S (Lasiagrostis) splendens</i>, Kunth Alpine region</p> <p><i>Tripsacum bromoides</i>, R & S</p> <p><i>T filiformis</i>, Nees</p> <p><i>Trisetum aureum</i>, Nees</p> <p><i>T subspicatum</i>, Beauv</p> <p><i>Triticum sativum</i>, Lamk Wheat is cultivated at various elevations, and in Tibet has been observed at 16,000 feet above the sea</p>		<p>IV HIMALAYAN GRASSES</p> <p>B. TEMPERATE</p>

FRAGARIA
vesca.**Strawberries.**Forbidden Fruit, see *Citrus decumana*, Linn Vol. II, 348.

Forest Trees, see Timbers.

(J Murray)

FORSKOHLEA, Linn, Gen Pl, III, 393675 **Forskohlea tenacissima**, Linn, Fl Br Ind, V, 593, URTICACEÆ**Habitat.**—Said to be a native of India, occurring at Simla (Stocks) and in the Panjáb (*Jacquemont Fleming*) extending to Afghanistan and Beluchistan**FIBRE**

Bark

676

Fibre.—The BARK yields a strong fibre hence the origin of the specific name but no definite information is obtainable regarding its economic use**Fourcroya**, Schult, see *Furcraea*, Vent**Foxglove Purple**, *Digitalis purpurea*, Linn SCROPHULARIACEÆ

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A European plant, naturalised in gardens in the temperate regions of India

FRAGARIA, Linn Gen Pl I 620

A genus of perennial herbs belonging to the Natural Order ROSACEÆ of which the swollen fleshy receptacle forms the STRAWBERRY Distributed through the temperate regions of the Northern Hemisphere South America the Sandwich Islands and Bourbon

[ROSACEÆ

678

Fragaria indica, Andr, Fl Br Ind, II 343 Wight, Ic, t 989

THE INDIAN STRAWBERRY

Syn—F MALAYANA Roxb F NILGIRICA Zenker F ARGUTA Lindl F ROXBURGHII W & A DUCHESNEA FRAGARIOIDES Sm D CHRY SANTHA Mig D FRAGIFORMIS Don POTENTILLA DENTICULORA and WALLICHIANA Ser P DURANDII Torr & Gr P FRAGARIÆ FOLIA Klotsch; P TRIFIDA Lehm**Vern**—Paljor kansars ingrach yangtarsh, bunun musrini bana-phal tawai Pb**References**—Roxb Fl Ind Ed C B C 409 Stewart Pb Pl 80 Atkinson Ec Prod N W P Pt V 68 69 Gasetteer N W P X 309 Balfour Cyclop 1149**Habitat**—This plant (a small yellow flowered *Fragaria*) grows on the Himálaya from east to west at altitudes of 5 000 to 8 000 feet also on the Khásia Hills and Nilghiris**FOOD**

Fruit

679

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Food—The indigenous strawberry yields abundantly a very insipid FRUIT which however, can be much improved by cultivation**F nilgerrensis**, Schild, Fl Br Ind, II, 344; Wight, Ic, t 988**Syn**—F ELATION W & A**Habitat.**—A species which may turn out to be only a variety of **F vesca**, found on the Khásia and Nilghiri mountains

It is a robust form and bears a large strawberry globose in form but inclined to be conoidal in the Nilghiris and flattened in the Khásia hills is of a pale pinkish white colour

FRUIT

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Fruit—There is no account of its cultivation but it might when crossed with **F vesca** yield a fine variety of strawberry**F vesca**, Linn Fl Br Ind, II, 344

THE STRAWBERRY

Vern—Kansars ingrach, bunun, tawai tash fraga bana-phal Pb**References**—Stewart Pb Pl 80 DC Origin Cult Pl., 203, Firminger Manual of Gard for Ind Part II 252, Atkinson Him Dist 309 713 Lisboa, U Pl Bomb, 155 Birdwood Bomb Pr 150 Balfour Cyclop,**F. 682**

Strawberries. (J Murray)	FRAGARIA vesca
<p>III 744; Smith Dic 394 Treasury of Bot I, 504 Gazetteer of the Simla Dist 12; Trans Agri Hort Soc, I, 21 (Proc), 241, IV, 106, V (Proc), 5 VI 247 235, Jour Agri Hort Soc (Old Series) IV (App), 83 VII, 285 VIII 214 (New Series) III 114</p> <p>Habitat.—Found wild in the temperate Himálaya from Murree and Kashmir altitude 5 000 to 10 000 feet, to Sikkim altitude 6 000 to 13 000 feet (<i>Hooker</i>) 6 000 to 10 000 feet in Manipur also found in the Ruby Mines and Bhamo districts of Burma The plant was quite neglected by the natives of India till its cultivation was commenced in the gardens of Europeans It is significant that in the <i>Asin Akbari</i> a work which treats in the utmost detail with the fruits cultivated during the reign of Akbar in India, Kashmir, and Afghanistan, no mention is made of the strawberry</p> <p>Dr Stewart says that the fruit of the Himálayan plant is excellent when gathered dry and improves by cultivation It is one of the most wholesome of fruits</p>	
CULTIVATION	CULTIVATION
<p>HISTORY OF—Since the first introduction of the cultivation of the strawberry into India the plant has spread in the most remarkable way in the plains from Behar in the south to Peshawar in the north At first the experiment of its cultivation was tried only in the hills where the temperature and natural conditions resembled those enjoyed by the fine fruit producing plant in Europe but it has since been grown with marked success in the Panjáb the North Western Provinces and Behar It with stands remarkably well the great heat of the hot weather and produces fruit abundantly and of very good quality from February to May, the season of ripening varying in different parts The <i>Madras Manual of Administration</i> (II 27 85 124) reports <i>F vesca</i> as thriving fairly well on parts of the Western Ghâts and in the Shevaroyes In lower Bengal and the plains of Madras and Bombay on the other hand the plant does not thrive it is seemingly unable to withstand the <i>moist</i> heat of those provinces</p>	History 683
<p>The earliest obtainable record of successful cultivation in the plains is one in the <i>Trans Agri Hort Soc</i> (I 21) by Dr Tytler in which he refers to the plant as growing to perfection on the banks of the Jumna near Allahabad It is not however definitely mentioned whether the plants alluded to were English stock or the indigenous <i>F vesca</i> but subsequent records show that both have been tried and that the strawberry of the Indian market now probably contains a strain of both</p>	
<p>METHOD OF—The strawberry thrives best in a light soil with old stable and vegetable manure at first but as soon as it begins to flower it ought to have goat s or sheep s dung applied round the roots</p>	Method of 684
<p>The following is the method laid down by Firminger in his <i>Manual of Gardening for India</i> —</p>	
<p>The time for planting out young strawberry plants is about the beginning of October I have put them out a month earlier than this, but without advancing the growth of the plants in the slightest degree The finest fruit in England is obtained from plants of two years old but in this country it seems all but universally agreed that young plants only of the current year's growth can be employed with success</p>	
<p>Having chosen a piece of ground fully exposed to the sun dig rows of holes in it eight inches in diameter and six inches deep the holes a foot apart and the rows also a foot asunder Fill the holes with a mixture of equal parts of old cow manure leaf mould and common soil and in each put down a strawberry plant Water the plants at the time and as often afterwards as they seem to require When they become well</p>	
F. 684	

**FRAXINUS
excelsior****Strawberries, the Common Ash****CULTIVA-
TION**

established they will perhaps begin to send out runners. Then it would be well to remove, though some persons are of opinion that the doing so causes a larger development of leaves than is favourable to the productiveness of the plant. By February they will have become good large plants, and may be expected then to be in full blossom.

The strawberry may be propagated either by seed or by rooted runners, but varieties can only be obtained from sports in seedlings or by hybridization.

Regarding its cultivation in Bombay, the Director of Land Records and Agriculture has furnished the following report dated September 1889: — 'Though it is much met with in gardens above the Ghâts it can only be successfully grown on the two hill stations of Mahábleswar and Panchgani where the fruit develops to a good size. The climate of the plains does not seem to agree with the plant. In Gondal and Kathmawár the plant was twice or thrice tried without success. Towards the end of 1887 about 2 000 strawberry plants were sent from Saharanpur to Mahábleswar and were distributed amongst cultivators. The plants have taken kindly to the soil and the plantations are in a flourishing condition. The cultivation of the strawberry has not however, gone as yet beyond the experimental stage.

The history of the ready adaptability of *F vesca* to the intense dry heat of the plains of Behar the Central Provinces and Upper India and of the greatly increasing production of the fruit encourages the hope that the cultivation of the strawberry, in the vicinity of hill stations and of towns in the plains of which the climatic conditions are favourable may become a large branch of market gardening. The outturn on even a very small area is very great in comparison to the outlay of money required but the crop is one that absolutely demands a great deal of attention. It is said that in the Bombay Dekkan where the plant is peculiarly difficult to grow a bed of a few square yards will bring in from £15 to £20 the season.

It also appears probable when one considers the history of the cultivated strawberry in Europe that a judicious system of crossing the indigenous *F vesca* with European stock or with the fine large *F vilgerrensis* might produce varieties of fruit in no way inferior to those obtained in Europe.

The success that has already attended the efforts of private and market gardeners in many parts of the country perhaps especially in the large strawberry gardens at Siri near Simla ought to encourage similar endeavours on the part of Natives near other large centres of demand.

Franciaurica crispa, Cass, see *Pulicaria crispa*, Benth. **COMPOSITÆ**

Frankincense, see *Boswellia*, Vol I, 511

FRAXINUS, Linn. *Gen Pl*, II, 676

A genus of trees consisting of 30 species found in the north temperate regions of both hemispheres of which 4 are natives of India.

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Fraxinus excelsior, Linn., *Fl Br Ind*, III, 606, **OLEACEÆ**

THE COMMON ASH

Syn — *F heterophylla* Vahl; *F moorcroftiana* Wall. **ORNUS MOOR**

CROFTIANA G Don

Vern — *Sám kám* Pb

References — Brandis *For Fl* 303 Gamble, *Man Timb* 256; *Pharm Ind*, 136 *Ainslie Mat Ind* I 209; O'Shaughnessy *Beng Dispens*, 435; *Flück & Hand*, *Pharmacog* 409

F 685

The Common Ash.

(J. Murray)

FRAXINUS
excelsior

Habitat.—A large tree of the temperate West Himalaya and Western Tibet from 4 000 to 9,000 feet; distributed from the Caucasus westward to Britain (*Fl Br Ind*)

According to Brandis "Basin of the Jhelam, Chenab and Ravi rivers, between 4 000 and 6 000 feet"

Cultivation.—Brown in his *Forester* (page 193) gives the following description of the propagation and cultivation of the Ash in England:—

"It is propagated by seeds and varieties are extended by grafting and budding on plants of the same species. The seeds are enclosed in what are termed 'samaras' or keys which are generally ripe for gathering about the end of October. When gathered for the purpose of sowing the seeds should be mixed with a quantity of dry sand or light dry earth in which they should be kept for eighteen months in order to rot off the outer coat and in order the more effectually to ensure this the whole mass of seeds and sand should be turned over every three months. The mass should not be much over one foot in depth as if more it will be liable to heat and in consequence the vitality of the seed would be injured. In the second March, after they are gathered the seeds should be sown in rows rather thinly and upon any moderately well pulverised soil. They are sure to come up thickly and injure one another if not sown thin—say one seed to every three square inches and the covering of earth should not exceed $\frac{1}{2}$ inch. In the following spring the plants will be ready for being transplanted into the nursery rows which may be 15 inches from one another and 4 inches plant from plant in the rows.

When the plants have stood two years in the nursery rows they may be removed into the forest ground but if wanted of a larger size they may be left a year longer.

'The ash is in all respects a hardy tree and accommodates itself to most soils and situations not too high lying and exposed but to grow it to large dimensions of timber and to have that of good quality the tree must be planted in a rather low lying situation and on a strong loamy soil but not a retentive one nor on one wet in the sub-soil. There is no situation so well fitted for the profitable growth of the ash as the sides of ravines having a good strong loamy soil where there is a constant supply of water for the roots from the ground above.

Brandis says that the tree requires much light, and that, like the teak, it grows best in a mixed forest.

Medicine.—A small quantity of saccharine matter exudes on incision from its bark. This only constitutes however a very small part of the MANNA of European commerce and does not appear to be used in India at all. The BARK is bitter and astringent and was at one time though very undeservedly, called *European Cinchona*. The LEAVES are purgative.

Structure of the Wood.—Whitish with a distinct brown, often mottled heartwood thus differing from that of *F floribunda*. According to Brandis its weight varies between wide limits slowly grown wood being sometimes lighter than wood which has grown more rapidly. Treagold gives the weight as from 43 lb to 50 lb per cubic foot but Brandis says he has seen English ash weighing as much as 55 lb.

It is of very great value on account of its toughness and elasticity which renders it highly useful for such purposes as the making of wheels oars, handles of tools and furniture. The young wood is valuable for the manufacture of hop-poles hoops, baskets &c. From the literature obtainable on the subject, it seems that the timber of the Indian-grown tree has not been thoroughly examined therefore it is not as yet known whether it possesses all the good qualities of the European ash. It is to be hoped, however, that this question may soon be cleared up, as there

CULTIVA-
TION
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MEDICINE.

Manna.

687

Bark

688

Leaves

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TIMBER

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FRAXINUS
ornus.**The Flowering Ash.****FOOD**
691
DOMESTIC
692
693

would seem no very great reason why the Ash should not become an important cultivated timber in this country

Food.—The fruit in England is preserved in vinegar as a pickle

Domestic, &c.—The ash coppices well (*Brandis*)

Fraxinus floribunda, Wall ; *Fl Br Ind*, III, 605

Syn.—FRAXINUS UROPHYLLA Wall ORNUS FLORIBUNDA Dietr ; O UROPHYLLA G Don

Vern—*Kangu tuhasi* NEPAL; *Angan angá dahkuri* N W P ; *Angá sun sunnu shun hám hamer tunnu* PB *Banarish* AFG

References—*Brandis For Fl* 302; *Gamble Man Timb* 256; *Stewart Pb Pl* 138, *Ainslie Mat Ind I* 209 *O Shaughnessy Beng Dis pens* 434; *Atkinson H m Dist* 737 *Gazetteers*—*Rawalpindi Dist.* 15; *N W P X* 313 *Gurdaspur Dist* 55 *Hasara Dist* 14; *Indisan Forester VI* 146 *IX* 200 *X* 317 *XIII* 67

Habitat—A large deciduous tree of the Himálaya from the Indus to Sikkim between 5 000 and 8 500 feet

Medicine—A concrete saccharine exudation (manna) is obtained from the stem by incision and is employed as a substitute for the officinal manna.

The sugar contained in this exudation called mannite differs from cane and grape sugar in not being readily fermentable though under certain conditions it does ferment yielding a quantity of alcohol varying from 13 to 33 per cent (*Dr Warden*) Like the officinal manna, this is used for its sweetening and slightly laxative properties

Structure of the Wood—White with a light red tinge no heartwood soft to moderately hard Weight 48lb per cubic foot It is very similar in structure to the wood of the European ash from which however it differs in having no heartwood

It is very valuable, possessing most of the qualities of European ash and is used for oars jampan poles ploughs platters spinning wheels and other purposes

The Conservator of Forests Panjáb writes 'In 1879 samples were supplied to the Timber Ordnance Agent Fattehgarh for sponge staves'

MEDICINE.
Manna
694**TIMBER**
695**696**

F. ornus, Linn DC, *Prodr*, VIII, 274

THE FLOWERING ASH

Syn—ORNUS EUROPEA Pers

This though not an Indian species may be briefly considered as it is the principal source of the drug known officinally in Europe as Manna **F rotundifolia** and **F excelsior** are however to a smaller extent also manna yielding ashes

Vern—*Shir khist* HIND *Shir-khist* DEC *Ménd*, TAM TEL *Manna* MALAY *Mann shir khisht* ARAB *Shir khisht* PERS

References—*Pharm Ind* 136 *Ainslie Mat Ind I* 208 *O Shaughnessy Beng Dispens* 434, *Fluck and Hanb Pharmacog* 409 *Irvine Mat Med Patna*, 101 *Birdwood Bomb Pr* 52 *Smith Dic* 26 *Kew Off Guide to the Mus of Ec Bot* 94

Habitat.—A small tree of the mountains of South Europe and Asia Minor extending in the Mediterranean region westwards to Corsica and Eastern Spain

Medicine—The name MANNA is applied to the saccharine exudation obtained by incision from this tree as well as to other substances Originally the name was applied to the miraculous food provided for the Israelites during their journey from Egypt but since then it has come to be used for most saccharine exudations The officinal manna of European medicine is the production of the three species of ash above mentioned, principally of **F ornus** and is frequently known from that circumstance as Calabrian manna It appears that the manna of Indian medi-

MEDICINE
Manna,
697**F 697**

The Flowering Ash Manna. (J. Murray)

FRAXINUS
ORNUS

cine is derived from a wholly different source. The true *shir khist* of the bazárs of North Western India is imported from Afghanistan, Turkestan, and Persia, and is probably the exudation of *Cotoneaster nummularia*, and to a lesser extent of *Araphaxis spinosa*. Flückiger and Hanbury have examined fragments of this *shir khist* and pronounce it to be indisputably derived from *Cotoneaster*. They write "It is in irregular roundish tears from about $\frac{1}{4}$ up to $\frac{1}{2}$ inch in greatest length, of an opaque, dull white colour slightly clammy and easily kneaded in the fingers. With water it forms a soapy solution with an abundant residue of starch granules. According to Ludwig *Shir khist* was found to consist of an exudation analogous to tragacanth but containing at the same time two kinds of gum and an amorphous lævogyre sugar besides starch and cellulose.

MEDICINE
Imported
manna.
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There is however, a certain amount of manna obtained in India from indigenous plants other than *Fraxinus* but to what extent this is actually used medicinally has not been determined nor indeed can it be said that we know definitely all the plants from which Indian Manna is derived [See *Alhagi* (Vol I 165) *Calotropis* (Vol II 37 47) and *Tamarix*]. A sample of manna has recently been received by the Reporter on Economic Products from the Central Provinces the source of which is being at present investigated. Dr Dymock to whom a specimen has samples have been sent has obligingly drawn the writer's attention to an interesting passage in the *Makhsan el Adwiyah* the author of which speaking of *Shir khist* writes and they say that in the towns of the Subeh of Behar Patna and Bhágulpur a substance like *shir khist* is obtained from a plant called in Hindi *Katra* and they prepare it in this manner the tree is cut down and fire applied to the root which causes a flow of boiling juice which concentrates into lumps like white sugar sweetmeats and this sugar has all the properties of the *shir khist*. *Harálalu* Hakim Mir Muhammad Abdul Hamid writes I have myself used it as *Shir khist*.

Indigenous
manna
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The manna alluded to in the above passage cannot possibly be the substance obtained from the Central Provinces which is evidently a natural exudation which falling in a shower incrustates leaves twigs stones &c with a deposit often $\frac{1}{2}$ an inch in thickness*. It may be added that the writer has presently under examination another Indian manna. As a probable consequence of an exceptionally dry autumn the pines of the Western Himálaya more especially *Pinus excelsa* have been exuding manna from the tips of the twigs which cementing the needles into clotted masses and melting through the heat of the sun has encrusted with a varnish like covering the leaves twigs and stones around the trees. This was apparently last mentioned by Major Madden and according to native opinion although *Pinus excelsa* sheds manna every now and then to a limited extent a large exudation participated in by *Pinus longifolia* and *Cedrus Libani*† only occurs once in twenty or thirty years. It is not reputed to be used medicinally, but is collected and eaten or employed in adulterating honey.

For the chemical composition of European officinal manna, which not being an Indian economic product need not here be further discussed, the reader is referred to the *Pharmacographia* of Flückiger and Hanbury. Therapeutically the Indian manna and the officinal article seem very similar. They are both employed as sweetening agents and as slight laxatives.

* Dymock reports that it does not appear to agree with any known manna. It, however, contains glucose and a crystalline sugar like mannite.

† *Rhododendron arboreum* has since been observed to be exuding manna as a result of Aphides.

FROGS.	The Ash, Frogs
	<p>Dr Ainslie writes "The Hindus know and care little about manna; the Muhammadans of India prescribe it as a laxative to children and delicate women, in doses from 3 2 to 3 ½ and the Arabians give it a place amongst their <i>Mushilat sufra</i> (cholagogues)"</p>
700	<p>Fraxinus xanthoxyloides, Wall ; <i>Fl Br Ind</i>, III, 606</p>
	<p>Syn.—F MOORCROFTIANA Brand ORNUS XANTHOXYLOIDES, G Don Vern—<i>Auga gaha</i> N W P <i>Hanus nuch shilli chuj, thum, shangal</i> <i>hanóch hanóch</i> Pb ; <i>Shang hagai</i>, PUSHTU</p>
	<p>References—<i>Brandis For Fl</i> 304 <i>Gamble Man Timb</i> 256, <i>Stewart Pb Pl</i> 130 <i>Atkinson's Flora of the Kuram Valley</i> 79; <i>Baden Powell Pb Pr</i> 581 <i>Balfour Cyclop</i> I 1151 <i>Indian Forester</i> V, 185 478; <i>Rawalpindi Gazetteer</i> 15; <i>Simla Gazetteer</i> 11</p>
	<p>Habitat—A small tree, or more often a shrub met with in Afghanistan the Trans Indus and from the Jhelum to Kumaon in the North West Provinces (<i>Gamble</i>) <i>Alitchison</i> in his <i>Kuram Valley Flora</i> mentions it as being found on the ascent to Péwar Kotál and occasionally all over the Harab district to Drékalla and Kárángah <i>Brandis</i> gives its distribution as the North Western Hímáláya from Kashmir to Kumaon between 3 000 and 9,000 feet and <i>Lace</i> mentions the shrub as growing near Quetta</p>
TIMBER 701	<p>Structure of the Wood—A good elastic wood of small size suitable for staves jampan poles walking sticks and employed for making ploughs in Kághán (<i>Baden Powell</i>) Used for agricultural implements (<i>Lace Quetta</i>)</p>
FODDER 702	<p>Fodder—Dr <i>Stewart</i> says its leaves are used as fodder and Mr <i>Lace</i> writes that in Southern Afghanistan the tree is never allowed to attain full size owing to its young branches being continually lopped and the leaves given to sheep and goats which are very fond of them</p>
	<p>French Bean, see <i>Dolichos Lablab</i>, pp 184 185 also <i>Phaseolus</i></p>
703	<p>French Honeysuckle, see <i>Hedysarum coronarium</i> Linn LEGUMI</p>
	<p>[NOSÆ</p>
	<p>FROGS</p>
	<p>Vern—<i>Renak</i> HIND <i>Bheng</i> BENG</p>
	<p>Amphibians of the sub-class BATRACHIA and order ANURA of which they constitute the family RANIDÆ They occur very commonly in all parts of India and are especially noticeable during the rains when their deafening croaking resounds on all sides Several species are peculiar to definite localities and many are characterised by the peculiar sounds they produce Amongst these one may be noticed an inhabitant of the Khasia Hills which has a croak so exactly similar to the tinkling of a hammer on an anvil that even some of the most accurate observers appear to have been deceived by it (<i>Him Journ</i> II 295) But perhaps the most amusing record of frogs in Indian literature occurs in the <i>Asin Akbari</i> the writer of which remarks: "Frogs also may be trained to catch sparrows This looks very funny" <i>Adams</i> in his <i>Wanderings of a Naturalist in India</i> mentions that at Poona having shot a sun bird which fell on the margin of a pool he saw it seized and devoured by a large green frog This lends a certain support to the somewhat extraordinary statement made by <i>Abul Fazl</i> Mr <i>Edgar Thurston</i>, the Superintendent of the Central Museum Madras in a recent exhaustive monograph on the Batrachia, Salientia and Apoda of Southern India has described six genera as natives of that region and Ceylon; viz 1 <i>Rana</i> 2 <i>Rhacophorus</i> 3 <i>Ixalus</i> 4, <i>Nyctibatrachus</i> 5 <i>Nann bratrachus</i>; and 6 <i>Nannophrys</i>, of which the first comprises 19; the second 14 the third 19 the fourth 2 the fifth 1, and the sixth 2 species Scientific information regarding the occurrence and distribution of the species of</p>

The Chief Fruits of India. (G Watt)	FRUITS.
<p>this family in other parts of India appears to be meagre, nor is there any record of the exact species or number of species used as food</p> <p>Food.—Certain species are eaten by some of the lowest caste natives in India and by many of the Burmese. In the bazars of the latter country, boiled frogs are exposed for sale amongst other articles of food (<i>Mason</i>).</p> <p>(G Watt)</p> <p>FRUITS</p> <p>The fruits of the East, it is believed, are much overrated in Europe. Many of the best of Indian fruits have been introduced from Europe, China, the West Indies and America. The most characteristic modern fruits of India are the mango, guava, lichi, pine-apple and plantain. The mangosteen is common in the Straits and is regarded as the most delicately-flavoured fruit of the East.</p> <p>It is remarkable that while the wild forms of many of the fruits of Europe are abundant as indigenous plants on the Himálaya, a very few only were cultivated before the arrival of Europeans, and the gooseberry, the currant and the bramble which have been carried to such perfection in Europe, are still uncultivated in India. The peach succeeds in the plains of India, but the effect of climate upon it is marked. In Bengal excellent peaches are to be had, attaining much of their European flavour and ripening into a soft pinkish separable pulp. They reach the market just before the mangos or at the beginning of the hot season. In the Panjáb this soft condition is rarely attained, and the pulp adheres firmly to the stone which breaks readily on the peach being cut open. On the Western Himálaya peaches do not succeed well; the rains apparently prevent the ripening of the fruit, while on the Nilgiris at the same altitude peaches are wonderfully good. The apricot shows a somewhat similar behaviour. In Afghánistán, Kashmír and Chamba, excellent apricots are obtained, and indeed the tree, if not indigenous to Afghánistán, is quite naturalised at an altitude between 6 000 and 9 000 feet. It is grown in the Panjáb, although not in the plains of India generally, but in the Panjáb and along the Himálayan chain the fruit is very inferior to the Kashmír and Afghán apricot. Even at Simla, only a few miles east of Chamba, the apricots are very inferior, and this degeneration increases on passing further east and south-east. In the moister mountain regions of Sikkim, Assam, and the Nilgiris the apricot cannot even be cultivated.</p> <p>The grapes of Kashmír and Afghánistán are famous, but, owing to the period of plucking and the method of packing, they have lost their natural flavour before they reach the plains of India. A very considerable trade is however done by the Kabuli merchants in small circular boxes of grapes. His Highness the Maharaja of Kashmír has successfully introduced the wine grape into Kashmír from which wine and brandy of good quality are obtained.</p> <p>The foreign trade in fruits is comparatively small, the cocoa nut being the chief article of commerce, but in the present work that is viewed as a NUT, not a FRUIT. The following enumeration may be given of the chief fruits of India, those bearing a * being introduced (i.e., non indigenous). For further information regarding the individual fruit yielding plants, the reader is referred to the articles regarding each in its respective alphabetical position in this work.</p> <p>*<i>Achras Sapota</i> Linn. THE SAPODILLA PLUM OR SAPOTA. SAPOTACEÆ</p> <p>*<i>Adansonia digitata</i>, Linn. THE BAOBAB TREE. SOUR GOURD. MONKEY BREAD. MALVACEÆ</p> <p><i>Egle Marmelos</i>, Correa. THE BEL OR BÆL FRUIT. RUTACEÆ</p>	<p>FOOD 704</p> <p>705</p> <p>FRUIT-YIELDING PLANTS 700</p> <p>F 706</p>

FRUITS.

The Chief Fruits of India.

FRUIT-YIELDING PLANTS

**Ananas sativa*, Linn THE PINE APPLE BROMELIACEÆ

There are many forms of this fruit and these improve in quality on passing eastward. They are fairly good in Bengal, but are excellent in Burma and the Malaya, where the plant seems to have become completely naturalised. Abul Fazl (in the *Ain-i Akbari* p 68) alludes to the pine-apple calling it *Kat hal-i Safar* or the Jack fruit of travellers. And in the *Tusuk-i Jahân gîrî* it is stated that the pine-apples at the time of Akbar's son came from the harbour towns of the Portuguese.

Anona reticulata*, Linn BULLOCK'S HEART ANONACEÆA. squamosa*, Linn THE CUSTARD APPLE or SWEET SOP**Artocarpus incisa*, Linn THE BREAD FRUIT TREE URTICACEÆ*A. integrifolia*, Linn THE JACK FRUIT

An important fruit with the natives of the plains of India rarely eaten by Europeans.

A. Lakoocha, Roxb THE LAKUCHA**Averhoa Carambola*, Linn, THE KARMAL GERANIACEÆ**A. Bilimbi*, Linn THE BILIMBI*Bassia butyracea*, Roxb SAPOTACEÆ*B. latifolia*, Roxb THE BUTTER or MAHWA TREE

The ripe corolla tubes constitute an important article of food with the people of the central table-land of India.

Borassus flabelliformis, Linn THE PALMYRA PALM PALMÆ

A common palm in Bengal and other parts of the plains. It produces its fruits in the cold season in the interior of which exists a cold, insipid gelatinous pellucid pulp eaten by the natives but only rarely by Europeans.

Capparis spinosa, Linn THE CAPER BERRY CAPPARIDÆ*Carica Papaya*, L, THE PAPAW or PAPAYA TREE PASSIFLOREÆ

It is significant that it is not mentioned in the *Ain-i Akbari* a fact that fixes its introduction into India as after the reign of Akbar.

Carissa Carandas, Linn THE CARENJA FRUIT APOCYNACEÆ

The unripe fruit is pickled the ripe fruit made into tarts.

Celtis australis Linn URTICACEÆ

Supposed by some to be the Lotus fruit of the ancients. *Conf* with *Diospyros Lotus*, Vol III pp 136—156.

Cephalandra indica, Nand, CUCURBITACEÆ*Citrullus Colocynthis*, Schrad ENGLISH COLOCYNTH CUCURBITACEÆ*C. vulgaris*, Schrad THE WATER MELON

Var *fistulosus* THE TANDUS

Citrus Aurantium*, Linn THE ORANGE RUTACEÆC. decumana*, Willd THE SHADDOCK, or POMELO, or FORBIDDEN FRUIT*C. Medica*, Linn THE CITRON LEMON LIME

Var 1.—*Medica proper* The Citron

Var 2.—*Limonum* The Lemon

Var 3.—*acida* The Sour Lime of India

Var 4.—*Limetta* The Sweet Lime.

Var 5.—*Lumia* The Sweet Lemon

The Chief Fruits of India.	(G Watt)	FRUITS.
<p><i>Cordia Myxa</i>, <i>obliqua</i>, and <i>Rothii</i> yield edible fruits often pickled. In Sind <i>C Rothii</i> is viewed as a regular fruit-tree.</p> <p><i>Cornus capitata</i>, <i>Wall.</i>, is generally classed as one of the Himálayan wild fruits, eaten and made into preserves.</p> <p><i>Cucumis Melo</i>, <i>Linn</i> THE MELON CUCURBITACEÆ There are many forms of this fruit met with in India, some being used as dessert fruits, others as vegetables Dr Aitchison found the melon wild in Afghanistan</p> <p><i>Cucurbita moschata</i>, <i>Duchesne</i> THE MUSK MELON CUCURBITACEÆ Eaten mostly as a vegetable</p> <p><i>Cydonia vulgaris</i>, <i>Tour</i> THE QUINCE ROSACEÆ</p> <p><i>Dillenia indica</i>, <i>Linn</i> THE CHALTA DILLENIACEÆ</p> <p><i>Diospyros Kaki</i>, <i>Linn f</i> EBENACEÆ THE CHINESE FIG and PLUM THE KEG FIG of JAPAN</p> <p><i>D Lotus</i>, <i>Linn</i> THE AMTOK or DATE PLUM These and other species of <i>Diospyros</i> yield edible fruits for which they are often cultivated</p> <p><i>Durio Zibethinus</i>, <i>DC</i> DURIAN, or CIVET CAT FRUIT TREE MALVACEÆ</p> <p><i>Elaeagnus</i>, <i>ELÆAGNEÆ</i> One or two species of this genus are cultivated by the hill tribes especially in Baluchistan They yield an edible fruit often known as the Wild Olive</p> <p>* <i>Eriobotrya japonica</i>, <i>Lindl</i> LOQUAT or JAPAN MEDLAR ROSACEÆ</p> <p><i>Eugenia Jambolana</i>, <i>Lam</i> THE JAM MYRTACEÆ</p> <p><i>E Jambos</i>, <i>Linn</i> THE ROSE APPLE</p> <p><i>Flacourtia Cataphracta</i>, <i>Roxb</i> BIXINEÆ Yields a fruit eaten by the natives It tastes like an inferior plum</p> <p>* <i>Ficus Carica</i>, <i>Linn</i> THE COMMON FIG URTICACEÆ</p> <p><i>Fragaria vesca</i>, <i>Linn</i> THE STRAWBERRY ROSACEÆ</p> <p><i>Garcinia Cowa</i>, <i>Roxb</i> THE COWA FRUIT GUTTIFERÆ This is a native of Eastern Bengal and yields an acid fruit which makes a remarkably fine preserve It ripens in the beginning of June</p> <p>* <i>G Mangostana</i>, <i>Linn</i> THE MANGOSTEEN This is by most writers held to be the most deliciously flavoured fruit of the East It is a native of the Malay Peninsula and while it may be grown in Bengal and Madras, it fails to produce good fruit anywhere beyond the limits of Burma.</p> <p><i>Grewia asiatica</i>, <i>L</i> THE PHALSA TILIACEÆ A common wild tree which yields an edible fruit, often cultivated near villages on this account</p> <p><i>Hibiscus Sabdariffa</i>, <i>Linn</i> THE ROZELLE or INDIAN SORREL MALVACEÆ There are two kinds differing in the colour of the succulent calyx—red and white—which forms the edible part.</p> <p>* <i>Lycopersicum esculentum</i>, <i>Miller</i> THE LOVE APPLE or TOMATO SOLANACEÆ.</p>		<p>FRUIT-YIELDING PLANTS.</p>

FRUITS.	The Chief Fruits of India.
FRUIT-YIELDING PLANTS	<p><i>Mangifera foetida</i>, <i>Lour</i> ANACARDIACEÆ</p> <p><i>M indica</i>, <i>Linn</i> THE MANGO TREE The number of cultivated and distinct forms of this fruit are probably as great as that of the European apple</p> <p><i>M sylvatica</i>, <i>Roxb</i> THE WILD MANGO</p> <p><i>Mimmsops hexandra</i>, <i>Roxb</i> THE KHIRNI SAPOTACEÆ Cultivated in Western India, especially at Goa, as a fruit. It is said to be agreeable and subacid</p> <p><i>Morus indica</i>, <i>Linn</i> THE MULBERRY URTICACEÆ A favourite fruit in many parts of India but especially so with the hill tribes</p> <p><i>Musa paradisiaca</i>, <i>Linn</i> THE PLANTAIN SCITAMINEÆ</p> <p><i>M sapientum</i>, <i>Linn</i> BANANA The number of Plantains and Bananas is very great The reader is referred to the account of them given under <i>Musa</i> in another volume The <i>chumpa</i> plantains of Bengal and Burma are perhaps the finest in flavour</p> <p><i>Myrica sapida</i>, <i>Wall</i> THE KAPHUL MYRICACEÆ A fruit of the Lower Himālaya and the Khasia Hills ripening about May Though largely eaten by the hill tribes the tree does not appear to be cultivated</p> <p>*<i>Nephelium Litchi</i>, <i>Camb</i> THE LITCHI SAPINDACEÆ This tree is supposed to have been recently introduced into India from China There are various forms differing in thickness and flavour of pulp The fruit comes into season in April and May It succeeds best in the hot damp areas such as in Bengal.</p> <p><i>N Longana</i>, <i>Camb</i> THE LONGAN FRUIT This fruit which ripens about the end of June, is in Calcutta about the size and form of a marble borne in great branches like grapes. The fleshy aril is, as in the Litchi the edible portion</p> <p>*<i>Olea europæa</i>, <i>Linn</i> THE OLIVE OLEACEÆ</p> <p>*<i>Opuntia Dillenii</i>, <i>Haw</i> THE PRICKLY PEAR CACTEÆ</p> <p>*<i>Passiflora</i>, PASSIFLOREÆ Several species of Passion flower yield edible fruits—the GRANA-DILLA fruit—especially <i>P quadrangularis</i>, <i>P laurifolia</i>, and <i>P edulis</i>. Though several species flower profusely on the Himālaya, none appear to be eaten in India.</p> <p>*<i>Phoenix dactylifera</i>, <i>Linn</i> THE DATE PALM PALMEÆ</p> <p><i>P sylvestris</i>, <i>Roxb</i> THE WILD DATE</p> <p><i>Phyllanthus Emblica</i>, <i>Linn</i> THE EMBLIC MYROBALAN EUPHORBIACEÆ Yields a useful fruit in the cold season which is pickled and made into jelly</p> <p><i>P distichus</i> <i>Muell</i> THE OTAHEITE GOOSEBERRY Yields a fruit which, when cooked with sugar greatly resembles green gooseberries It is a native of India, though only rarely met with in cultivation</p> <p>*<i>Physalis peruviana</i>, <i>Linn</i> THE CAPE GOOSEBERRY OF TIPARÍ SOLANACEÆ Extensively cultivated in the plains of India and eaten in dessert or made into jam and chutney Become quite acclimatised in some parts of the country</p>

The Chief Fruits of India.	(G Watt)	FRUITS.
<p>* <i>Prunus armeniaca</i>, Linn THE APRICOT MISHMUSH OR MOON OF THE FAITHFUL ROSACEÆ</p>		<p>FRUIT-YIELDING PLANTS.</p>
<p>* <i>P Avium</i>, Linn THE SWEET OR BIRD CHERRY</p>		
<p>* <i>P Cerasus</i>, Linn THE SOUR CHERRY The <i>Flora of British India</i> states that both species of cherry occur on the North West Himálaya in a state of cultivation at altitudes up to 8 000 feet Of <i>P Avium</i> it is added that it is almost naturalised The writer has never seen it except in gardens, and the Himalayan wild cherry is <i>P Puddum Roxb</i></p>		
<p>* <i>P communis Huds</i> THE PLUM</p>		
<p>Var domestica. ALUCHA</p>		
<p>Var insititia. THE BOKHARA PLUM</p>		
<p>The plum although most successfully grown in the gardens of Upper India as Delhi Saharanpur &c is much less successful on the plains than the peach On the Himálaya it also succeeds admirably and becomes of such flavour as to admit of its being classed as a dessert fruit The plums of the plains make admirable preserves</p>		
<p>* <i>P persica</i>, Benth & Hook THE PEACH</p>		
<p>The peach has a greater claim to be regarded as indigenous on the Himálaya than any other member of this series of fruit trees (except perhaps the cherry) It occurs near every village in the North West Himálaya the fruit often never even eaten by the people though in many cases of good quality In the neighbourhood of towns where Europeans reside it is cared for and the fruit brought to market but even in such cases the natives do not themselves seem to appreciate it Throughout the plains it is also frequent, and even in the neighbourhood of Calcutta produces admirable peaches It is in fact the only <i>Prunus</i> that appears to be able to withstand tropical influences It yields in fact more freely and the fruit is of much finer flavour in the plains than on the Himálaya The North West Himálayan peach (where the tree is probably indigenous) is small green and seems never to ripen the fruits remaining on the trees from May to November In the plains on the other hand it does not last more than three weeks or a month the fruits coming into season in the middle of May</p>		
<p>The Nectarine is a glabrous form of the peach A flattened peach is also common but what is perhaps more significant the green semi wild fruit of the Himálayas is a <i>clingstone</i> fruit, while that of the greater part of the plains and Nilgiri hills is <i>freestone</i></p>		
<p><i>P Puddum, Roxb</i></p>		
<p>Commonly known as the WILD or HIMALAYAN CHERRY</p>		
<p>A plentiful small tree in the Temperate Himálaya (3 000 to 7 000 feet) becoming covered with its elegant pink flowers in October and ripening its yellow orange or pink fruits in March These are not or only rarely eaten by the Natives but are sold to the Europeans to be used in the preparation of cherry brandy</p>		
<p><i>Pyrus baccata</i>, Linn THE SIBERIAN CRAB ROSACEÆ</p>		
<p><i>P communis</i>, Linn THE COMMON PEAR</p>		
<p>The hard round pear of the North West Himálaya is quite distinct from the modernly introduced pyriform fruit and it is probably an indigenous production In Kullu and other parts of the Himálaya large yellow soft luscious pears are grown which compare favourably with any of the pears produced in Europe</p>		

FRUITS

The Chief Fruits of India.

FRUIT-YIELDING PLANTS

Pyrus Malus, Linn THE APPLE

On the North West Himálaya there are many forms of this fruit some admittedly of modern introduction, and others by Brandis &c spoken of as "apparently wild" The Afghan apple is a peculiar oblong fruit with pink marblings and wooly flavour This is met with in many parts of the Western Himálaya often becoming less than an inch in length while preserving all its other characters A flattened dark-green apple which when ripe colours faintly on one side, is also frequent on the Himálaya occurring in the gardens of the poorest peasants and forming a neglected shrub of enclosures It is probable that these forms represent the so-called wild fruit but the writer would be much more disposed to accept the round pear as indigenous than to admit any of the apples as such A small yellow pippin is common in Delhi Saharanpur and other Panjáb plains stations It comes into season about April and May At Kullu and also near Simla, large orchards have recently been established where apples almost equal to the best produced in Europe may now be purchased The credit of having developed this new industry is mainly due to Sir E O Buck

P Pashia, Ham

This indigenous plant (cultivated in Kullu and elsewhere on the Himálaya) yields a fruit which is edible on falling from the tree in an over ripe state (See Fungoid Pests p 457)

* *Psidium Guyava, Raddi* THE GUAVA TREE MYRTACEÆ* *Punica Granatum, Linn* THE POMEGRANATE GRENADES, *Fr* GRANATS *Ger* LYTHRACEÆ*Rhododendron arboreum, Sm* ERICACEÆ

The flowers of the tree *Rhododendron* are regularly collected and made into a pleasant subacid jelly They appear in February to May

Rhodomyrtus tomentosa, Wight THE NILGHIRI HILL GOOSEBERRY MYRTACEÆ

This elegant shrub yields a berry which is largely collected and in South India is made into a jelly resembling apple jelly

Ribes SAXIFRAGACEÆ

The Gooseberry and Currant, though wild plants on the Himálaya do not appear to be cultivated

Rubus; ROSACEÆ

Various species of Bramble and Raspberry are collected from the wild source none are cultivated like *R Idæus*—the Raspberry—of Europe *R ellipticus* is the yellow raspberry the fruits of which are collected and sold at bazárs on the Himálaya it comes into season in May to June

Sambucus nigra, L THE ELDER BERRY CAPRIFOLIACEÆ

Though two or three species of Elder occur on the Himálaya they do not appear to have been grown for their berries nor does the true Elder berry appear to have been introduced

Spondias dulcis Willd THE OTAHEITE APPLE ANACARDIACEÆ*S mangifera, Pers* THE HOG PLUM*Tamarindus indica, Linn* THE TAMARIND LEGUMINOSÆ*Triphasia trifoliata.** *Vitis vinifera, Linn* THE GRAPE AMPELIDEÆ

The early records of Kashmír (such as the *Asni Akhari*) shew that grape cultivation was once upon a time more extensive than at the present

The Bladder Wrack.

(J Murray)

**FUCUS
vesiculosus****FRUIT-
YIELDING
PLANTS**

day The fruit is described two centuries ago, as having been carried from the northern hilly tracts of India in basket loads and sold in the plains at Rs 3 to 4 a basket At the present day the better class of grapes obtained in the plains of India are those imported by Kabul merchants preserved in cotton wool in small circular boxes At hill stations, as at Simla grapes of a very superior quality are grown from recently imported European stock At one time a large trade was done in Bashahr in growing grapes for the Simla market and raisins into Tibet A disease however appeared in the form of a destructive insect and the cultivation has in consequence been almost completely abandoned A small grape, which also occurs wild is collected and sold in the bazárs It yields a peculiarly flavoured fruit very refreshing but which bears little resemblance to the European grape It appears to be the produce of *Vitis parvifolia*, but it is probable the cultivated states of this small grape may have a strain of hybridization possibly with *V. vinifera* Throughout the plains of India in favourable situations grape cultivation occurs as a garden curiosity but the fruits obtained are small green and unpalatable though in some parts of Upper India *eg* in Peshawar the results are much more satisfactory

Zizyphus Jujuba, Lam THE BAER OR JUJUBE, THE CHINESE DATE
RHAMNÆ

Z. vulgaris, Lamk

The long or round plum the *Kul phul*, is largely cultivated by the natives of the plains of India

For further information see NUTS

(J Murray)

FUCUS

The typical genus of the family FUCACEÆ belonging to the Natural Order ALGÆ It is characterized by having plane compressed or linear fronds generally of a brownish colour which in some species grow to a great length The only two species which have been described as Indian are *F. nodosus* and *F. vesiculosus*.

Fucus amylaceus, O Sh

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The name under which O'Shaughnessy described and brought to notice the plant yielding the 'CEYLON Moss' *Gracilaria lichenoides*, Grev (*which see*)

F. nodosus, Linn

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THE KNOBBED SEA WRACK

Habitat.—A very common sea weed in the northern temperate seas said by Murray (*Plants and Drugs of Sind*) to be found commonly along the sea shore

Similar in properties to the following species:—

F. vesiculosus, Linn ; Bent & Trim, t 304

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THE BLADDER WRACK

Syn.—*F. SPIRALIS* Linn ; *F. DIVARICATUS*, Linn ; *F. DISTICHUS* Lightf ; *F. BALTICUS*, Ag *F. PLATYCARPUS* Thuret

Habitat.—Very common on the shores of the United Kingdom, also along the North Atlantic Ocean, from Norway and Greenland to the West Indies and on the North Pacific coast of America It is said by Murray in his *Plants and Drugs of Sind* to be found on the Manora Rocks

Medicine.—The entire alga is used in the manufacture of a medicine Since the introduction of Iodine however it has gone greatly out of use and is not now to be found in the British Pharmacopœia, nor in those of

**MEDICINE.
710****F. 710**

FUEL	Fuel and Firewood		
	<p>India and the United States To the natives of India the plant as a medicinal substance is unknown Its therapeutic properties are very similar to those of iodine being deobstruent, and considered of specific value in scrofulous affections, rheumatism, and glandular swellings, particularly goitre</p> <p>In 1862 Dr Duchesne Dupare described it as having a marked effect in diminishing obesity and it is said to be an ingredient in the extensively advertised nostrum — 'Anti Fat' In Europe this plant for a long time formed a considerable source of soda alkalis but its importance for this purpose has diminished in recent years Its principal value is now in the manufacture of IODINE and BROMINE as it with <i>F. nodosus</i> forms the greater part of the sea weed burned to form KELP</p> <p>Fodder and Manure — It is said by Greville to form an article of FODDER and SHEEP FOOD in some of the islands of Scotland It is also a valuable MANURE</p> <p>It is possible that both species of <i>Fucus</i> may be found in greater quantity than is generally known along the northern shores of the Indian Ocean in which case it is well to remember their important economic properties.</p>		
Iodine 711 Bromine 712 Kelp 713 FODDER 714 MANURE 715			
716			
	<p>FUEL & FIREWOOD</p> <p>With very few exceptions all the timber trees of India might be used as firewood Certain timbers however emit an objectionable odour and on that account are rarely used others are too valuable The heat-giving property is a point of great importance in fuel-supply and it seems probable that a thorough investigation of the heat evolved from given weights of timber would greatly narrow the list of plants which should be enumerated as suitable for steam purposes whether railway or machinery</p> <p>FUEL AND FIREWOOD TIMBERS &c, USED FOR—</p> <table> <tr> <td> <i>Abies Smithiana</i> (= <i>Picea Morinda</i>) <i>Acacia arabica</i> <i>A. Catechu</i> (firewood for steamers) <i>A. leucophloea</i> <i>A. melanoxylon</i>. <i>A. planifrons</i> <i>Adhatoda Vasica</i> (brick burning) <i>Adina sessilifolia</i>. <i>Ægiceras corniculata</i>. <i>Alangium Lamarckii</i>. <i>Albizzia amara</i>. <i>Amoora cucullata</i> <i>Anogeissus latifolia</i>. <i>Avicennia officinalis</i> <i>Balanites Roxburghii</i> <i>Berberis aristata</i>. <i>B. vulgaris</i> <i>Betula cylindrostachys</i> <i>Boswellia serrata</i>. <i>B. thurifera</i>. <i>Briedelia stipularis</i> <i>Bruguiera gymnorhiza</i>. <i>Calligonum polygonoides</i> <i>Capparis aphylla</i>. <i>Carissa diffusa</i>. <i>Cassia siamea</i> (Ceylon locomotive fuel) </td> <td> <i>Castanopsis tribuloides</i> <i>Casuarina equisetifolia</i>. <i>Ceratoma Siliqua</i>. <i>Cerbera Odollam</i> <i>Cenops Candolleana</i> <i>Cordia Myxa</i>. <i>C. Rothii</i>. <i>Coniaria nepalensis</i>. <i>Cornus capitata</i>. <i>Croton caudatus</i> <i>Crypteronia paniculata</i>. <i>Cynometra ramiflora</i>. <i>Dalbergia Sissoo</i> (Railway fuel) <i>Dillenia indica</i>. <i>Elkebergia indica</i> <i>Elæagnus hortensis</i>. <i>Ephedra vulgaris</i> <i>Eucalyptus Globulus</i>. <i>Eurya japonica</i>. <i>E. symplocina</i>. <i>Excæcaria Agallocha</i>. <i>E. indica</i>. <i>Ficus religiosa</i>. <i>F. retusa</i>. <i>Fraxinus xanthoxyloides</i> <i>Garuga pinnata</i>. <i>Helicteres Isora</i>. </td> </tr> </table>	<i>Abies Smithiana</i> (= <i>Picea Morinda</i>) <i>Acacia arabica</i> <i>A. Catechu</i> (firewood for steamers) <i>A. leucophloea</i> <i>A. melanoxylon</i> . <i>A. planifrons</i> <i>Adhatoda Vasica</i> (brick burning) <i>Adina sessilifolia</i> . <i>Ægiceras corniculata</i> . <i>Alangium Lamarckii</i> . <i>Albizzia amara</i> . <i>Amoora cucullata</i> <i>Anogeissus latifolia</i> . <i>Avicennia officinalis</i> <i>Balanites Roxburghii</i> <i>Berberis aristata</i> . <i>B. vulgaris</i> <i>Betula cylindrostachys</i> <i>Boswellia serrata</i> . <i>B. thurifera</i> . <i>Briedelia stipularis</i> <i>Bruguiera gymnorhiza</i> . <i>Calligonum polygonoides</i> <i>Capparis aphylla</i> . <i>Carissa diffusa</i> . <i>Cassia siamea</i> (Ceylon locomotive fuel)	<i>Castanopsis tribuloides</i> <i>Casuarina equisetifolia</i> . <i>Ceratoma Siliqua</i> . <i>Cerbera Odollam</i> <i>Cenops Candolleana</i> <i>Cordia Myxa</i> . <i>C. Rothii</i> . <i>Coniaria nepalensis</i> . <i>Cornus capitata</i> . <i>Croton caudatus</i> <i>Crypteronia paniculata</i> . <i>Cynometra ramiflora</i> . <i>Dalbergia Sissoo</i> (Railway fuel) <i>Dillenia indica</i> . <i>Elkebergia indica</i> <i>Elæagnus hortensis</i> . <i>Ephedra vulgaris</i> <i>Eucalyptus Globulus</i> . <i>Eurya japonica</i> . <i>E. symplocina</i> . <i>Excæcaria Agallocha</i> . <i>E. indica</i> . <i>Ficus religiosa</i> . <i>F. retusa</i> . <i>Fraxinus xanthoxyloides</i> <i>Garuga pinnata</i> . <i>Helicteres Isora</i> .
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Fuel and Firewood, Fuller's Earth. (J. Murray) FULLER'S EARTH

Hentiera littoralis.
Hibiscus tiliaceus
Hippophae rhamnoides.
Hydnocarpus alpina.
Juniperus communis.
J. excelsa
J. recurva.
Kandelia Rheedii
Lebedieropsis orbicularis
Lonicera quinquelocularis.
Lumnitzera racemosa.
Lycium europæum
Mæssa montana.
Mallotus philippinensis.
Meliosma Wallichii.
Mimosa dulcis.
Myrcaria elegans.
M. germanica.
Myrsine semiserrata
Nyctanthus Arbor tristis
Olea ferruginea.
Phyllanthus Emblica.
Ptern ovalifolia.
Pinus longifolia (bark as fuel)
Pithecolobium dulce.
Pongamia glabra.
Populus balsamifera.
P. euphratica
Premna integrifolia.
P. latifolia.

Premna mucronata.
Prinsepia utilis
Prosopis spicigera.
Prunus armenica
Pygeum zeylanicum.
Quercus acuminata.
Q. ilex
Q. incana.
Q. lanuginosa.
Q. semecarpifolia.
Randia dumetorum
Rhamnus virgatus
Rhazya stricta.
Rhododendron arboreum
Rhus mysorensis.
Salix (species)
Salvadora oleoides
S. persica.
Securinega leucopyrus
Sesbania ægyptiaca.
S. grandiflora
Sonneratia acida.
Streblus asper
Symplocos lucida.
Tamarix dioica.
Taxus baccata (burnt as incense)
Terminalia tomentosa.
Teucrium macrostachyum
Xylosma longifolium
Zizyphus rugosa

TIMBERS
 USED FOR
 FUEL AND
 FIREWOOD

FULLER'S EARTH, *Ball In Man Geol of India, Vol III 570*

The following brief note on this subject has been obligingly furnished by Mr H B Medlicott for this work —

Fuller's earth

TERRE À FOULON *Fr* WALKERERDE, *Ger* CRETA DA SODARE
 I PANNI *Ital*

As regards the distribution of Fuller's Earth in India, information is very incomplete but it is known to be carried for long distances from certain localities where it occurs. In the Bhagalpore division of Bengal in the neighbourhood of Colgong, a *sabun mitti* or soap-earth is obtained. In Rajputana a fuller's earth used to be obtained in fissures of quartz and schistose rocks with carbonate of lime, near Ajmir. At the village of Meth, near Kolath in the Bikanir State fuller's earth is excavated. In some parts of Western Sind a pale greenish clay is found which is used for washing cloth, &c. it is also eaten by pregnant women. In the Panjáb in the Dera Ghazi Khan and Multan districts a clay resembling fuller's earth is imported from the interior of the Suleman Range the so-called *Multan mitti* imported into Multan is of three qualities —

- (1) White mitti called "*khajru*" or edible from Bikanir and Jessalmir,
- (2) Yellow mitti or "*bhakra*" for dyeing cloths, from the same localities,
- (3) Light green or "*sabus mitti*" for cleaning the hair from Vadur in the Dera Ghazi Khan district

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F. 720

**FUMARIA
parviflora****The Fumitory**

At Nilawan in the Salt Range, a lavender coloured clay or decomposed rock which is found with volcanic rock at the above locality, is used as fuller's earth by the natives. The reader is referred for further information to the article CLAY (Vol II pp 360—368, but especially paragraph No 1319 on *Edible and Medicinal Earths*)

Fulwa Butter, see *Bassia butyracea*, Roxb, Vol I, 405

FUMARIA, Linn Gen Pl, I, 56 965

A genus which belongs to the Natural Order FUMARIACEÆ having about eight species usually weeds of cultivation in the temperate regions of the Old World. Only one of these is indigenous to India, namely *F parviflora*, but *F officinalis*, Linn may be also briefly considered as it yields the true Fumitory and is employed in Native medicine

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Fumaria officinalis, Linn ; FUMARIACEÆ

Vern—*Pit pāpārā* HIND *Shātrā* DEK Turu TAM *Chata rashī* TEL *Baglatul mulh shateray* ARAB ; *Shāhtara* PERS

References—*Pharmacographia Indica* I, 114 *Ainslie, Mat Ind* I 138 *O'Shaughnessy Beng Dispens* 184 *Moodeen Sheriff Supp Pharm Ind* 273 *Dymock Mat Med W Ind* 52

Habitat—A weed of cultivation in Persia. Two varieties of Fumitory are described in the *Makhsan el Adwiyā* one with violet coloured flowers and the other and larger kind with white flowers

F officinalis was mentioned by Dr Stewart in 1859 as occurring as a field weed near Abbottabad but it is probable that the plant he collected was really *F parviflora*, since *F officinalis* has not been found by other botanists in India

Medicine—The entire plant except the root is used medicinally constituting FUMITORY which has long been known and was highly esteemed by the Greeks and Romans. It is however, not now employed by European practitioners and is not to be found in the Pharmacopœia of England America or India although still much used in this country by native practitioners. The fumitory sold in Bombay is this species (*Dymock*) and is imported from Persia while in Upper India the indigenous plant is substituted

The vernacular terms are used indiscriminately, and as the medicinal properties are similar, the uses of both species may be detailed in the account of the Indian plant

MEDICINE
Fumitory
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F parviflora, Lamk Fl Br Ind I, 128

Vern—*Pitpāpara* (*Pitpāpra*) HIND *Ban sulpha* BENG *Shāhtara pit-pāpra, pāpra* PUSHTU ; *Shatra*, SIND ; *Pitpāpra* BOMB *Pitpāpā* GUZ ; *Pitpāpara shātrā* DEC ; Turā TAM *Chāta rashī* TEL *Buhs lat-ul mulh baglatul-mulh* ARAB ; *Shatra shāhtarah* PERS

References—*Roxb Fl Ind Ed CBC* 531 *Stewart Pb Pl* 11 *Pharmacographia Indica*, I, 115 *O'Shaughnessy Beng Dispens* 184 *Moodeen Sheriff Supp Pharm Ind* 273 *Dymock Mat Med W Ind* 52 *S Arjun Bomb Drugs* 9 *Murray Pl and Drugs Sind* 77 *Irvine Mat Med Patna* 90 *Moodeen Sheriff Mat Med Madras* 22 *Atkinson Him Dist* 737 *Birdwood Bomb Pr* 7 *Aitchison Afgh Del Com Rep* 128 *Balfour Cyclop I* 1155 *Bomb Gas*, VI 14 *Raj Gas* 30

Habitat—Found in rice-fields during the cold season in the Indo-gangetic plain, Lower Himalaya (up to 8 000 feet), and Nilgiri hills. It is described by Dr Aitchison as generally distributed over the whole of Afghanistan

Medicine—Fumitory has long been regarded as laxative diuretic alterative, tonic, diaphoretic, and febrifuge. It has consequently been

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Fungi and Fungoid Pests

(J. Murray)

FUNGI, &c.

much used by native practitioners in India, and is still highly esteemed by the Muhammadans. It is however very little used by European practitioners and its value has probably been overestimated by the natives. Dr Thornton however is of opinion that the drug is useful in leprous affections and in the recently published *Pharmacographia Indica* fumitory is described as beneficial in dyspepsia due to torpidity of the intestines, and as a valuable remedy in scrofulous skin affections.

SPECIAL OPINIONS —§ The leaves and stems given in the form of infusion in doses of 1 to 2 ounces are much used as a febrifuge and alterative." (*Lal Mahomed Hospital Assistant, Hoshangabad Central Provinces*)

FUNGI AND FUNGOID PESTS

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The FUNGI of India are very numerous and comprise many species of economic interest. Several are used as food others as medicine while certain microscopic forms are of importance since they produce the rusts, moulds, smuts and other pests which infest many of our crops, fruits, and timber trees. The writer is much indebted to Dr Barclay for having kindly revised the following brief article.

Vern —(For large mushroom like fungi) *Kumbh samarogh, herar* (Bazar names) HIND BENG *Ot Santal Kat phula*, ASSAM *Mopsha* CHAMBA *Manskhel* KASHMIR *Shiran bat bahri bun-phal kunba kdnahach kangach kanha bichu girchhatra mans kel moksha, khumba khambur chattri* PB *Samarogh* AFG *Kuti bubha khumba* SIND *Alombe kalambe* BOMB *Kagdana chhatra* GUZ *Chattrak* SANS *Kullalsh-dio* (Fairies) *chattri mar samarugh* PERS

References —Stewart Pb Pl 267 Barclay's *Descriptive List of the Uredinae of the Western Himalaya* also in *Sc Memoirs by Med Officers of the Army of India Parts II, III IV V*; Dymock *Mat Med W Ind*, 865 Fluck & Hanb *Pharmacog*, 740 S Arjun *Bomb Drugs* 84 Balfour *Agricultural Pests of India* 59 Baden Powell Pb Pr 257 384 Balfour *Cyclop* I 1156, Smith, Dic 183 *Treasury of Bot* I 512, *Jour Agri Hort Soc*, Vol V Pl 1 pp 51 53 *Indian Forester* XIII 290 389

Medicine —For an account of the medicinal uses of the different forms of *Agaricus* and *Polyporus*, the reader is referred to the article on the former in Vol I at page 129. Balfour mentions a fungus found growing on the roots of a bamboo in Burma which is regarded by the natives as a valuable anthelmintic.

MEDICINE
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The spores of a fungus probably of *Lycoperdon gemmatum* are sold in the bazars of the Panjab and are considered to act like *Agaricus* and *Polyporus* by expelling cold and bilious humours. A medicinal truffle *Melanogaster durassiums*, Cooke, is found in abundance near Simla, and is much used by the natives (see Truffle). *Schrotium stipatum*, Curr which occurs in the nests of white-ants is also supposed to possess medicinal virtues (Balfour).

Food —For a description of the principal edible forms in India namely, *Agaricus campestris*, *Morchella esculenta*, *Helvella crispa*, and *Hydnium coralloides*, see the article Mushroom under the heading *Agaricus campestris*, also the description of the Indian Truffle under the heading Truffle.

FOOD
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Besides these the more important species there are no doubt many other forms widely used as food by certain classes of natives in India, but it is to be regretted that, owing to the meagreness of the literature on the subject, a complete list cannot be given. The Muhammadans will only eat *Morchella agaricus* as they consider the others impure food. Most Hindus eat any mushroom which has a pleasant taste and odour. Mr Gibbon, in the *Journal of the Agri Horti Society, Ind (N.S.)*, Vol V., pp 51—53 describes a species of *Lepiota* as being found in the nests of white-ants and eaten with relish by the natives. Stewart also mentions

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FUNGI, &c.

Fungi and Fungoid Pests.

FOOD

another species as being freely eaten in the Panjáb which is known as *shirán* in the Jhelam, and *bat bakri* in the Kair valley. He describes it as 'a thin, flat ragged looking Fungus, yellow above and with white gills below which is got on dead trees in various parts of the Panjáb Himálaya at 8 000 to 8 500 feet. The natives slice and cook it either fresh or dry and eat it as a relish with bread. I have tried this species in stews, &c, but found it leathery and flavourless.'

The same author also mentions an "underground mushroom" of doubtful species found in cultivated ground near Multan and known as *boin-phal* in the vernacular. This he says is also eaten by the natives.

Balfour in his *Agricultural Pests of India* p 61 describes an underground fungus *Mylitta*, as occurring in the Nilgiri hills and considers it probably closely allied to the so-called native-bread of Tasmania but gives no record of its being eaten by the natives.

FERMENTS

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Ferments—Some of the microscopic forms seem to be useful as substitutes for yeast (see *Cerevisiæ Fermentum*, Vol II 257).

FUNGOID PESTS

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Fungoid Pests, the characters of which can generally be made out by the use of the microscope only are small fungi which attack and injure the plants or animals on which they are parasitic. Among the more hurtful in India are species of *Æcidium* *Capundium* *Chætium* *Clarterisporum* *Diplodia* *Dothidea*, *Eurotium* *Glenospora* *Hemileia* *Hendersonia*, *Hydnum* *Isaria* *Leutinus* *Pellicularia* *Pestalozzia* *Puccinia* *Russula* *Septoria* *Uromyces* and *Ustilago* (*Balfour's Agricultural Pests of India*). *Chionyphe Carteri* *Berkeley* (Mycetomasp. of *H. Vandyke Carter*) is the fungus whose ravages cause the deeply seated disease known as the MADURA FOOT.

Polyporus anthelminticus, *Berkeley* grows at the root of old bamboos and is employed as an anthelmintic in Burma.

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Ergot—Is the sclerotoid condition of *Claviceps purpurea* (see Vol II 359).

Ergot

731

Fungi attacking plants produce an appearance on the leaves stems &c known as MILDW, MOULD, RUST or SMUT. These small parasites present many features of great interest both to the botanist and agriculturist but owing to the difficulty of determining their life-histories little is as yet known regarding them. The following forms however are those which are at present recorded as attacking the more important crops and trees of India—

Mildew

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Mould

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Rust.

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Smut.

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Peridermium Thomsoni, *Berkeley* is a fungus found on the *Picea Morinda* of the Himálaya. The leaves under the growth of the parasite become reduced one half in length curved and sprinkled sometimes in double rows with *Æcidia*. The growth in time proves fatal to its host. Dr Barclay has recently described three species of URIDINÆ which attack the same tree in the North Western Himálaya—two species of *Æcidium* and one of *Chrysomyxa*. One of the *Æcidia* causes general pseudo hypertrophic distortion of the needles of its host while the other attacks only the youngest shoots. The first of these may be the same as that described above but the data given in the description of *Peridermium Thomsoni* are not sufficient to allow of a decision being arrived at. Dr Barclay, while regretting that he has not had the time nor opportunity to fully work out the life-history of his first species writes 'A continued study of it is much to be desired if only from an economic point of view for the affection must prove very destructive to these valuable timber trees. Apart from the diversion of nutriment it must occasion the habit it has of attacking new shoots, and so completely involving them as to destroy them must be most injurious to these trees.' A similar *æcidial* parasite has also been found on *Cedrus Libani*, var *Deodara*, by the same investigator. *Pinus longifolia* and *P. excelsa*, particularly the former

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Fungi and Fungoid Pests.	(F Murray)	FUNGI, &c
are largely attacked in certain parts of the Himálaya by an æcidial parasite found on the needles only		FUNGOID PESTS
<i>Acacia eburnea</i> , Willd is attacked largely in the Poona district by a species of <i>Æcidium</i> which Dr Barclay has named <i>A. esculentum</i> to indicate its edibility a rare property in this group of fungi the only other one known to be eaten being <i>A. Urticæ</i> , Schum var <i>himalayense</i> , Barclay Mr Wroughton Forest Officer of the Poona Division informed Dr Barclay that the fungus is universally eaten in that region, after being cooked as a relish		736
<i>Gymnosporangium</i> .—Dr Barclay has kindly furnished the following information: The only URIDINE occurring on fruit trees that I have come across is a species of <i>Gymnosporangium</i> , on <i>Pyrus Pashia</i> . This I believe is a new species and I am describing it in a forthcoming paper as <i>G. Cunninghamianum</i> (<i>Scientific Memoirs by Medical Officers of the Army of India Part V</i>) It has some resemblance to <i>G. clavariiforme</i> , Fieq., and I provisionally named it so in my list of Simla Uridineæ		737
<i>Puccinia graminis</i> , Pers is assumed to be the form of CORN MILDEW which occurs commonly on the cereals of the Himálaya where three species of <i>Barberry</i> occur on two of which the æcidium bearing parasite has been found by Dr Barclay The same <i>Puccinia</i> is generally believed to be the cause of rust and mildew in other parts of India also but as no species of <i>Barberry</i> occurs in the plains it is probable that the parasite in such regions has a different life-history It has been suggested that the WHEAT RUST of the plains is due to a species of <i>Æcidium</i> reared on a <i>Euphorbia</i> (see article on Ergot, Vol II 359)		738
<i>Melampsora</i> .—Flax crops are often attacked in some localities especially the Central Provinces with rust which has been supposed to be the same species as that attacking cereal crops but Dr Barclay informs the writer that this parasite is a species of <i>Melampsora</i> and probably <i>M. Lini</i> Pers It is probable that the Rust on Mustard which is also largely prevalent, is a species of the same genus but its identity has not been established		Wheat rust 739 740
<i>Chrysomyxa</i> .—A species of this genus (<i>C. himalense</i> , Barclay) is extensively prevalent in the Simla region on <i>Rhododendron arboreum</i> Linn; giving rise to conspicuous witches-brooms Another species (<i>C. Piceæ</i> , Barclay) occurs on <i>Picea Morinda</i> .		741
<i>Ravenelia</i> .—Two species of this fungus <i>R. sessilis</i> Berk and <i>R. stricta</i> , Berk & Br, are noted by Dr D D Cunningham to be very common in the neighbourhood of Calcutta the former on <i>Albizia Lebbek</i> , and the latter on <i>Pongamia glabra</i>		742 743
<i>Hemileia vastatrix</i> Berk & Br as is well known has been immensely destructive to the coffee plantations of Ceylon and Southern India		744
<i>Peronospora</i> .—The POTATO crops of Assam have been largely attacked by <i>P. infestans</i> . Dr D D Cunningham has noted the occurrence of <i>P. arborescens</i> as a destructive parasite on the POPPY It is quite possible that the cause of the destruction of the VINE industry of Basahr was due to <i>P. viticola</i> but unfortunately there is no sufficient evidence to show what was really the cause of that vine disease It may very possibly have been due to <i>Oidium</i> (<i>Erysiphe</i>) Tuckeri		745
Dr D D Cunningham reports the existence of a root blight in the Darjeeling district TEA gardens The blight was undoubtedly due to a fungus but the specimens at his disposal did not enable him to determine its nature		746
<i>Tilletia caries</i> , or BUNT is a fungus which attacks WHEAT and occupies the whole farinaceous portion of the grain SORGHUM and the SMALL MILLETS are liable to attacks from allied parasites		Bunt. 747
<i>Ustilago</i> or SMUT has been described by Dr Cooke as attacking BARLEY and many GRASSES in the Panjáb, also the male flowers of the		Smut. 748

FURS

Fur bearing Animals

FUNGOID
PESTS

MAIZE In 1870 a form of *Ustilago* made its appearance on **RICE** and is said to have affected a considerable portion of the crop in the neighbourhood of Diamond Harbour in Bengal. The mycelium of this fungus grows into the tissues of its host, forming a whitish, gummy interlaced thread like net, in which the spores form. These become at length a more or less coherent mass dirty green on the exterior of the infected grain but of a bright orange-red colour inside. Dr Barclay in a note kindly furnished on this subject writes 'The smut on wheat barley and oats in Europe is *Ustilago segetum* Bull and Dr Brefeld informs me that the Indian species is identical with it. That on Maize is *U. Maydis* DC.

In concluding these brief notices of Fungoid Pests the hope may be expressed that the present active researches of Dr Barclay in the Simla District and of others into the interesting life-history of these fungi may clear up many points which are at present very obscure and so perhaps open a way to fresh exertions in devising methods for the prevention of the destruction effected by these pests.

For further information regarding Fungoid Pests see Coffee, Indigo, Rice, Wheat, &c

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FURCROEA, *Vent Gen Pl III 739*

An American genus of Amaryllidaceous plants containing some 10 or 15 species. These are closely allied to the *Agaves* and indeed are commercially viewed as identical the fibres derived from the two genera being collectively designated American Aloe fibres. *Furcraea gigantea*, the best known fibre yielding species of this genus was formerly known as *Agave foetida*, and by some writers *Agave vivipara* is spoken of as *Furcraea Cantala*.

There is very little that need be said here regarding these plants. A few of them are cultivated in India and these have been experimentally tested for their fibres. In this country however their cultivation as sources of fibre has up to this time been very unimportant and insignificant compared with the degree to which they are utilized in Mauritius. The fibre of *F. gigantea* is in fact commercially designated *Mauritius Hemp*. The reader is referred to the article *Agave* in Vol I pp 133-144.

Furniture See Cabinet Work, Vol II 1

750

FURS

The following list of the principal fur bearing animals of India compiled principally from Forbes Watson's report on a proposed Industrial Survey of India, may be given, leaving the reader for further information regarding trade description and qualities of fur &c to refer to the articles on the animals grouped under their popular or commercial names (Deer &c) and to that on **SKINS**. The writer is indebted to Major Ward for having kindly revised and supplemented this enumeration.

751

Aliurus fulgens, *F. Cuv* The Red Cat Bear

Vern.—*Wah* TIBET

752

Arctictis binturong, *Raffles* The Black Bear-Cat

Vern.—*Myouk kya* BURM

753

Arctomys bobac, *Schuler* The Marmot

Vern.—*Kandia-piu* TIBET

754

A. hemachalanus, *Hodgson* The Red Marmot

Vern.—*Drin* KASH

755

Canis aureus, *Linn* The Jackal

Vern.—*Gidar kola* HIND

756

C. lupus, *Elliot* The Tibet Wolf, or Black Wolf

Vern.—*Chanco hakpo chanko* TIBET

F 756

Fur-bearing Animals.	(F Murray)	FURS.
<i>Canis pallipes</i> , Sykes The Indian Wolf Vern.— <i>Bhera laudgah</i> HIND		757
<i>Capra hircus</i> , Linn The Domestic Goat Vern.— <i>Gumnapari bakra</i> HIND		758
<i>Cuon rutilans</i> Temm The Wild Dog Vern.— <i>Fangli kuta sona kuta ram kuta ban-kuta</i> HIND ; <i>Kosla</i> , MAR ; <i>Resa kutta</i> TEL		759
<i>Felis bengalensis</i> , Blyth The Leopard Cat Vern.— <i>Chita-billi</i> HIND		760
<i>F. chaus</i> Guld The Common Jungle Cat Vern.— <i>Fangli billi</i> HIND		761
<i>F. caracal</i> , Schreber The Caracal Vern.— <i>Siagosh</i> HIND		762
<i>F. jubata</i> Schreber The Cheetah or Hunting Leopard Vern.— <i>Chita</i> HIND		763
<i>F. leo</i> Linn The Lion Vern.— <i>Singha sher babbar sher</i> HIND		764
<i>F. lynx</i> The Lynx (includes <i>F. isabellina</i> The Tibet Lynx) Vern.— <i>Es</i> TIBET		765
<i>F. nebulosa</i> , Griffith <i>vel diardi</i> , Hodgson The Clouded Leopard Vern.— <i>Zik</i> BHOT		766
<i>F. pardus</i> , Linn The Pard Vern.— <i>Tendua chita</i> HIND		767
<i>F. tigris</i> Linn The Tiger Vern.— <i>Bagh sher sela vagh nahar</i> HIND		768
<i>F. torquata</i> , F Cuv The Spotted or Desert Cat		769
<i>F. uncia</i> , Schreber The Ounce or Snow Leopard Vern.— <i>I ker</i> TIBET <i>Burrel hay</i> SIMLA		770
<i>F. viverrina</i> , Bennet The Tiger Cat or Fishing Cat Vern.— <i>Mach-bagrul</i> HIND		771
<i>Galeopithecus volans</i> , Linn The Flying Lemur Vern.— <i>Kabong</i> MERGUI		772
<i>Halicon dugong</i> , Erxl The Dugong Vern.— <i>Talla-maha</i> CEYLON		773
<i>Herpestes pallidus</i> The Common Mongoose Vern.— <i>Mangús newul newa nyul</i> HIND		774
<i>H. jerdoni</i> , <i>vel monticolus</i> . The Long tailed Mongoose Vern.— <i>Konda-yeutawa</i> TEL		775
<i>Lagomys roylli</i> , Ogilby The Himálayan Mouse Hare Vern.— <i>Abra</i> NEPAL		776
<i>Lepus nigricollis</i> , Cuv The Black naped Hare Vern.— <i>Khargosh</i> HIND		777
<i>L. pallipes</i> , Hodgson The Tibet Hare Vern.— <i>Rek, rigong</i> TIBET		778
<i>L. ruficandatus</i> , Geoffr The Indian Hare. Vern.— <i>Khargosh</i> , HIND		779
<i>Loris gracilis</i> , Shaw The Slender Lemur, Sloth. Vern.— <i>Dewantiss-pullis</i> TEL		780

FURS	, Fur-bearing Animals.
781	<i>Lutra leptonyx</i> <i>Horsf</i> The Clawless Otter Vern.— <i>Chusam</i> BHOT
782	<i>L. nair</i> <i>F Cuv</i> The Common Indian Otter Vern.— <i>Pani káta</i> HIND
783	<i>Macacus silenus</i> , <i>Anderson</i> The Black Lion-tailed Monkey
784	<i>Martes flavigula</i> , <i>Bodd</i> The Indian Marten Vern.— <i>Tuturala</i> N W HIM <i>Mal sampira</i> NEPAL
785	<i>M. toufaeus</i> <i>Hodgson</i> The Tibet or Beech Marten Vern.—No name Major Ward writes <i>M. toufaeus</i> , <i>Hodgson</i> is found in Ladak, Baltistán Tibet &c I have seen skins brought to Simla and have killed it in many places in Baltistán It is a highly priced fur I think <i>M. erminea</i> has been confused with <i>M. toufaeus</i> in its winter coat
786	<i>M. kathiah</i> , <i>Hodgson</i> The Yellow bellied Weasel Vern.— <i>Kathia-nyal</i> NEPAL
787	<i>M. strigidorsa</i> , <i>Hodgson</i> The Striped Weasel Vern.—No name
788	<i>M. subhemachalana</i> <i>Hodgson</i> The Himálayan Weasel Vern.— <i>Krau or grau</i> KASH
789	<i>Nycticebus tardigradus</i> , <i>Geoffr</i> The Slow paced Lemur Sloth Vern.— <i>Sharminda billi</i> HIND
790	<i>Ovis aries</i> , <i>Linn</i> The Domestic Sheep Vern.— <i>Hunich kago silingia peluk</i> NEPAL
791	<i>Paradoxurus bondar</i> <i>Gray</i> The Tree Cat Vern.— <i>Chinghar</i> HIND <i>Bondar laum</i> BENG
792	<i>P. musanga</i> , <i>Raffles</i> The Common Tree Cat Vern.— <i>Mennie lakati</i> HIND
793	<i>Prophagus grunniens</i> , <i>Linn</i> The Yak Vern.— <i>Yak ban-chur</i> HIND
794	<i>Pteromys alboniger</i> The Black and White Flying Squirrel Vern.— <i>Piam piyu</i> BHOT
795	<i>P. caniceps</i> The Grey headed Flying Squirrel Vern.— <i>Biyom chimbo</i> LEPCHA
796	<i>P. inornatus</i> , <i>Geoffr</i> The White-bellied Flying Squirrel Vern.— <i>Rusi gugar</i> KASH
797	<i>P. magnificus</i> , <i>Hodgson</i> The Red bellied Flying Squirrel Vern.— <i>Puraj blakut</i> NEPAL
798	<i>P. petaurista</i> , <i>Pallas</i> The Brown Flying Squirrel Vern.— <i>Pakya</i> MAHR
799	<i>P. spadicens</i> The Red Flying Squirrel Vern.— <i>Kymet-shov-byan</i> , ARAKAN
800	<i>Rhizomys badius</i> , <i>Hodgson</i> The Bamboo Rat Vern.— <i>Yemcron</i> NEPAL
801	<i>Sciurus giganteus</i> The Black Hill Squirrel Vern.— <i>Shou</i> TENASSERIM
802	<i>S. indicus</i> The Bombay Squirrel Vern.— <i>Shekra</i> MAHR

•	Fur-bearing Animals. \	(F Murray)	FUSTIC.
	<i>Sciurus lokriah</i> , Hodgson The Red bellied Grey Squirrel Vern.— <i>Lokriah</i> NEPAL		803
	<i>S. maclellandi</i> , Horsf The Himálayan Squirrel Vern.— <i>Kall gangdin</i> LEPCHA		804
	<i>S. macrourus</i> , Forster The Grizzled Hill Squirrel Vern.— <i>Rookerah</i> CINGH		805
	<i>S. maximus</i> , Schreber The Red Squirrel Vern.— <i>Karrat</i> , HIND		806
	<i>S. palmarum</i> , Gmelin The Common Indian Ground Squirrel Vern.— <i>Gilheri</i> HIND		807
	<i>Semnopithecus johni</i> , Anderson The Nilghiri Langur Vern.— <i>Turuni kodan pershk</i> TODA ; <i>Korangu</i> BUDUGA & KURUMBA ; <i>Karing-korangu</i> MALAY		808
	<i>S. schistaceus</i> , Hodgson The Himálayan Langur Vern.— <i>Langár</i> HIND		809
	<i>Talpa micrura</i> , Hodgson The Mole Vern.— <i>Biya kantiyem</i> BHOT		810
	<i>Vulpes bengalensis</i> . The Indian Fox Vern.— <i>Lumri, lokri</i> HIND		811
	<i>V. ferrilatus</i> , Hodgson The Tibetan Grey Fox Vern.— <i>Iger</i> TIBET		812
	<i>V. flavescens</i> , Gray The Persian Fox Vern.— <i>Wamer</i> NEPAL		813
	<i>V. fuliginosus</i> , Hodgson Tibet Fox Vern.— <i>Theske</i>		814
	<i>V. griffithii</i> . The Afghanistan Fox		815
	<i>V. leucopus</i> , Blyth The Desert Fox		816
	<i>V. montanus</i> Pearson The Hill Fox Vern.— <i>Wamoo</i> NEPAL		817
	<i>V. pusillus</i> , Blyth The Panjáb Fox		818
	<i>Ursus isabellinus</i> , Horsf The Brown Bear Vern.— <i>Barf ka-rich bhalu</i> HIND		819
	<i>U. labiatus</i> , Blainv The Black Bear, or Sloth Bear Vern. <i>Bhalu rich</i> HIND		820
	<i>U. malayanus</i> , Raffles The Malayan Sun Bear Vern.— <i>Bruang</i> MALAYAN		821
	<i>U. torquatus</i> , vel <i>tibetanus</i> . The Himálayan Black Bear Vern.— <i>Bhalu</i> HIND		822
	<i>Urva cancrivora</i> , Hodgson The Crab-eating Mongoose Vern.— <i>Urva</i> NEPAL		823
Fustic, see <i>Maclura tinctoria</i> and <i>Rhus Cotinus</i> .			

GALLS	The Cod, The Cheese Rennet, Galls
	<p style="text-align: center;">GADUS</p> <p>I Gadus morrhua, Linn , Pisces THE COMMON COD The fish from which the official Cod Liver oil is obtained, is not a native of the Indian seas; it abounds on the coasts of Norway France Britain Ireland, and is specially common in the seas along the coast of Newfoundland The oil extracted from the liver is imported into this country for medicinal purposes It is a valuable alterative and nutritive tonic especially beneficial in scrofulous and tuberculous affections rickets, and other diseases due to impaired nutrition</p> <p>SUBSTITUTES 2 Substitutes.—Several Indian fish yield oil which is however owing to carelessness in methods of manufacture generally rancid and unfit for medicinal use Dr Bidie states that the best of these oils and one that might be substituted for the official OLEUM MORRHUÆ is that obtained from the livers of certain species of Carcharias which abound off the Western Coast See Carcharias, Vol II 155 also Fish, Vol II 368 397</p> <p>3 Galangal, see Alpinia Galanga, Willd Vol I p 192 Galbanum A gum resin probably obtained from two species of Ferula, viz F galbaniflua and F rubicaulis See Vol III 338 Galena or Sulphide of Lead, see Lead, Vol IV</p> <p style="text-align: center;">GALIUM, Linn Gen Pl, II 149</p> <p>A genus of small weak herbs of the Natural Order RUBIACEÆ comprising about 150 species mostly temperate Of these 20 are natives of India and occur chiefly on the Temperate Himálaya</p> <p>4 Galium verum, Linn ; Fl Br Ind III, 208 RUBIACEÆ THE CHEESE RENNET References —<i>Boiss Fl Orient III 62; Balfour Cyclop I, 1163 Smith Dic 107 Treasury of Bot I 517</i> Habitat —A perennial herb with erect or rambling stems from 1 to 3 feet high found in the Western Himálaya at altitudes of 5,000 to 10 000 feet</p> <p>DYE Roots 5 Dye.—Smith mentions that the ROOTS are extensively collected in Europe for the dye which they yield which is said by him to be equal to madder Several other species of the genus yield a purple dye but no mention appears to be made by Indian writers of their utilisation in this country</p> <p>DOMESTIC Plant 6 Domestic Uses —The PLANT was formerly extensively employed in Europe as a reagent for curdling milk from which property it has derived its popular name but in India the best known vegetable rennet is Withania coagulans</p> <p>7 Galium, sp An undetermined species of GALIUM, mentioned by Aitchison as very common in the shade of rocks on the low hills near Badghis in Afghánistan which was observed by him to dye the hands a yellow green on collecting it (<i>Botany of Afgh Del Com 73</i>)</p> <p style="text-align: center;">GALLS</p> <p>8 Galls. By the term gall is commonly understood a deformity or excrescence due to a parenchymatous hypertrophy of the structure of a plant caused</p> <p style="text-align: center;">G 8</p>

Gall-bearing plants, Gambier

(J Murray)

GAMBIER.

by insects The exciting cause of these local growths appears in most cases to be a minute quantity of some liquid irritant, introduced within the tissues by the female insect, through the puncture made by her ovipositor. Subsequent irritation however, must be kept up by the presence of the ovum or later, of the larva and this, without doubt, plays an important part in the formation of many galls.

Galls vary greatly in character with the plant on which they occur, and with the insect by which they are produced but all possess many qualities in common, qualities which render them of great economic value. It is unnecessary in an article such as the present to enter into the subject of the different insects which give rise to these hypertrophies but it may be mentioned that the Hymenoptera, Diptera, Hemiptera, Homoptera, and Coleoptera all comprise several gall forming genera. A list of the chief Indian gall yielding trees is appended. Not only are the galls of these trees largely employed but the parasitical excrescences of *Quercus insectoria*, *Oliver* are also largely imported into India from Basra and the Persian Gulf ports. They are used as adjuncts in several processes of dyeing shades of brown grey and lavender for tanning leather and for medicinal purposes.

For information regarding the vernacular names and special economic properties of the several Indian galls, the reader is referred to the articles on the plants they infest, in their respective alphabetical positions in this work.

References—*Roxb Fl Ind Ed C B C* 381 *Brandis For Fl* 23 120 123 170 171 184, 224 226 302 316 381 481 *Kurz For Fl Burm I* 207 *Stewart Pb Pl*, 47 54 74 91 92 *Pharm Ind* 29 59 89 209 *Ainslie Mat Ind I* 144 602 *O'Shaughnessy Beng Dispens* 607 *Moodeen Sheriff Supp Pharm Ind* 145 239 *U C Dutt Mat Med Hind* 298 319 *Dymock Mat Med W Ind 2nd Ed*, 76 78 191 194, 319 729 *Fluck & Hanb Pharmacog* 167 595 *Bent & Trim, Med Pl* 249 *Murray Pl and Drugs Sind* 46 47 189 *K L Dey, Indigenous Drugs of India* 99 *Irvine, Mat Med of Patna* 68, *Baden Powell Pb Pr* 471 472 *Drury U Pl* 413 419 *Lisboa U Pl Bomb* 241 259 *Birdwood Bomb Pr* 9 19 83 309, 313 *McCann Dyes and Tans Beng* 162 *Buck Dyes and Tans N W P* 23 36 *Liotard Dyes* 11 13, 14 17, *Spons Encyclop* 1983 *Balfour Cyclop I* 1164 *Treasury of Bot I* 518 *District Manual Trichinopoly* 16 *Special Reports from For Dept in Panjab N W P Ajmere Merwara Sind N Circle Bombay S Circle Madras and from J H Luce Esq Quetta*

LIST OF THE CHIEF GALL BEARING PLANTS OF INDIA

Acacia leucophloea, Willd
Areca Catechu, Linn
Cinnamomum zeylanicum, Breyn
Fraxinus floribunda, Wall
Garuga pinnata, Roxb
Litsea polyantha, Fuss
Pistacia integerrima, Stewart
P. mutica var cabulica, Stocks
Pongamia glabra, Vent

Prosopis spicigera, Linn
P. Stephaniana, Kunth
Quercus Ilex, Linn
Salvadora oleoides, Dcne
Tamarix articulata, Vahl
T. dioica, Roxb
T. gallica, Linn
Terminalia Chebula, Retz
T. tomentosa, Bedd

9

GAMBIER

Gambier

This resinous extract is prepared from *Uncaria Gambier*, *Roxb*, much in the same manner in which Cutch or Catechu is made. The plant is a native of Malacca, Penang and Singapore, distributed to Java and Sumatra. The extract made up in small (one inch) cubes, is of a pale

10

G 10

GARCINIA
Cambogia**Gambier, The Garcinias**

greyish yellow colour and has a bitter taste. It is largely imported into India to be eaten in *pán* but the yellow semi-crystalline form of Cutch prepared in Kumáon is to a large extent used for the same purpose, and is even made up in cubes to resemble Gambier. Gambier is an officinal drug in the British Pharmacopœia, and is known in medicine as pale catechu. In the United States Dispensatory Catechu (*Acacia Catechu*) is officinal while Gambier is rejected. In the Indian Pharmacopœia both drugs are officinal.

A certain re-export trade in Gambier takes place from India but the official designation (in Trade Returns) of 'Cutch and Gambier' should be understood to refer almost exclusively to the dark or Pegu form of Cutch and to the pale or Kumáon form of so-called Gambier. See *Acacia Catechu*, Vol I pp 29 to 40 also *Uncaria*.

Gamboge, see the various species of *Garcinia*

Game Birds, see Ducks, &c, also Peacock, Pheasant Pigeon, and Snipe.

Gao-zaban, see *Echium*, sp, p 200, also *Onosma bracteatum*, Wall, BORAGINÆ

GARCINIA, Linn *Gen Pl*, I, 174

A genus of trees usually yielding yellow juice which belongs to the Natural Order GUTTIFERÆ and comprises in all some 50 species, which are distributed over Tropical Asia, Africa, and Polynesia. Of these about 30 are natives of India and several possess features of considerable economic interest.

II

Garcinia anomala, Planch & Triana *Fl Br Ind*, I, 266, [FERÆ
GUTTI

Syn — *GARCINIA AFFINIS* Wall (in part)

References — *Kurs For Fl Burm* I 80 *Kurs, Prelim For Rep on Pegu App A xii Indian Forester* IV, 241 XI 392

Habitat — A small erect tree found in the beds of torrents in the Jaintia Hills and Khásia Mountains between altitudes of 3 000 and 5 000 feet also not uncommon in the damp and dry hill forests of Martaban east of Tounghoo at elevations of from 4 000 to 6 000 feet

Gum Resin — The tree yields an inferior gamboge' (*Kurs*)

Structure of the Wood — Sapwood white soft (*Kurs*)

G Cambogia, Desrouss, *Fl Br Ind* I, 261

Syn — *GARCINIA ZEYLANICA* Roxb *G AFFINIS* Wight & Arn (not of Wall) *G ELLIPTICA* Wall

Var 1 — *CONICARPA* Wight *lc* 121 (excl 8)

Var 2. — *PAPILLA*, Wight *lc* t 960 961 (sp)

Vern. — *Vilash amli* BOMB; *Hila*, BURGHES (NILGHIRIS) *Aradal*, *manthullu* KAN *Goraka*, SING

References — *Wight & Arn Prod* I 561 *Roxb Fl Ind*, Ed C B C 442 *Corom Pl*, III, t 298 *Beddome Fl Sylv* t 85; *Gamble Man Timb* 24 *Thwaites En Ceylon Pl*, 48 *U S Dispens* 15th Ed 1183 *Mason Burma and its People* 480, 515 *Drury U Pl* 220; *Lasboea U Pl Bomb* 10 147 241; *Cooke Gums and Gum resins* 41 *P W D Report on Gums* 2 79 34, *Balfour Cyclop* I 1175, *Treasury of Bot* I 206 *Indian Forester* II 20 58 XI 379 392, *Madras Manual of Administration*, II, 65 135 *Gazetteers* — *Bombay XV* 427 *Mysore and Coorg* I, 68; *Special Reports from the Conservators of Forests of Southern Circle Madras and Bombay*

Habitat. — A small evergreen tree of the mountains of the Western Peninsula from Concan to Travancore also met with in Ceylon

Gum-Resin — Thwaites states that this species yields (in Ceylon) a yellow, insoluble very adhesive gum, which is valueless as a pigment on account of its insolubility in water. It is, however, easily soluble in

G. 15

GUM
12
TIMBER
13
14GUM
15

or Gamboge Trees.

(7 Murray)

GARCINIA
COWA.

spirits of turpentine, and is likely to prove useful as a varnish. A considerable amount of confusion exists in the descriptions of various writers regarding this gum resin. Thus in the P W Dept Report, above cited Mr Broughton writes that the substance appears very similar to true Gamboge and of very fine quality. It appears probable however, that the gum resin he examined which was collected by Beddome, was really the exudation of *Garcinia Morella*, Desrouss. Recent reports received from the Conservators of Forests in Madras and Bombay confirm Thwaites' statement as to the uselessness of the gum resin as a pigment.

Oil—Mr Cherry mentions that this species affords an oil which is used in medicine (*Gamble*).

Food—The acid rind of the fruit is employed as food and when dried is eaten as a condiment in curries.

Structure of the Wood.—Grey cross grained shining hard weight 54lb per cubic foot' (*Gamble*). An excellent straight grained lemon coloured slightly elastic wood which is easily worked and would answer for common furniture (*Beddome*).

Garcinia cornea, Linn Fl Br Ind, I 260 Wight Ic, t 105

Syn—*GARCINIA AFFINIS* Wall Cat 4852 4853 and 4854 in part not of Wight & Arn DISOSTIGMA FABRILE Miquel

References—Roxb, Fl Ind Ed C B C 444 Kurz, For Fl Burm I 88 Kurz in As Soc Journ Beng XXXIX 64 Prelim For Rep on Pegu, App A, xi Balfour Cyclop I 1175; Ind Forester XI 392

Habitat—An evergreen tree, from 40 to 60 feet in height met with in Eastern Bengal and Burma

Gum Resin—Yields an inferior kind of Gamboge

Structure of the Wood—Brown heavy of a coarse unequal fibre hard rather close grained (*Kurz*)

G Cowa, Roxb Fl Br Ind I 262 Wight, Ic, tt 104 & 113

Syn—*GARCINIA KYDIA* Roxb G ROXBURGHII Wight G UMBELLI FERRA Roxb G WALLICHII Choisy G LOBULOSA Wall OXYCARPUS GANGETICA Ham

Vern.—*Cowa* HIND Taungthaldé toung-da lai ma-dow BURM

References—Wight and Arn Prodr I 101, Roxb Fl Ind Ed C B C 442 Kurz For Fl Burm I 90 Prelim For Rep on Pegu App A xi Gamble Man Timb 24 Mason Burma and its People 480 482 751 Cooke Gums and Gum resins 42, Liotard Dyes 91 Balfour Cyclop I 1175 Burm Gas I 132 Indian Forester XI 392

Habitat.—A tall evergreen tree of Eastern Bengal Assam Chittagong Burma and the Andaman Islands

Gum Resin—This species produces a kind of gamboge but of a paler colour than that of *G Morella*, and according to Mason, insoluble in water. In the *Burma Gasetteer* it is described as forming with spirits of turpentine, a very beautiful and permanent yellow varnish for metallic surfaces.

Dye.—Liotard mentions that the BARK is employed in the Pegu District to produce a light yellow colour principally in the colouring of cloth for the garments of Buddhist monks. It is cut up into small pieces, boiled in water and strained the acid liquid of applewort bark being used as a mordant.

Food—Roxburgh describes the FRUIT as edible ' though not the most palatable '.

Structure of the Wood.—Greyish white moderately hard Weight 37 to 47lb per cubic foot (*Gamble*). White, turning yellow rather heavy, coarsely fibrous, loose grained, very perishable (*Kurz*)

OIL.
16
FOOD
Rind
17
TIMBER
18

19

GUM
20
TIMBER
21
22

GUM
23

DYE
Bark
24

FOOD
Fruit
25
TIMBER.
26

GARCINIA indica.**The Gamboge Trees**

27

Garcinia echinocarpa, *Thw ; Fl Br Ind , I , 264*Vern — *Madol SING*References — *Beddome Fl Sylv Anal Gen xxi Thwastes En Ceylon Pl 49 Indsan Forester X 33*

Habitat. — A tall tree of the Central and Southern Provinces of Ceylon

OIL.

Seeds

28

Oil — A thick oil, extracted from the SEEDS is used by the Sing halese for burning in their lamps, but it gives a very indifferent light (*Thwastes*)

29

G eugeniaefolia, *Wall Fl Br Ind , I 268*

Habitat — A small tree of the Eastern Peninsula found in Singapore, by Wallich and in Malacca by Griffith

GUM

30

Gum Resin. — Helfer mentions that the stem exudes a green varnish and Griffith that the juice of the fruit is milky No further information, in confirmation of these interesting statements is, however, available

31

G heterandra, *Wall , Fl Br Ind I 265*Syn — *HEBRADENDRON WALLICHII Chois Kurz* considers this Burmese species to be identical with the Sylhet specimen *G ELLIPTICA*, *Wall* and he retains the latter name for both *The Flora of British India* however reduces the Sylhet plant to *G Morella Desrouss* a synonymy that has been here followed It appears probable that the information given by writers on the resources of Burma regarding the plant they call *G elliptica Wall* really refers to the species at present under consideration and will consequently be detailed in this articleVern — *Thanat tau tha nat dau BURM*References — *Kurz For Fl Burm I 92 in As Soc Jour Beng XLIII pt II 87, Prelim Forest Report on Pegu App A xiii Gamble Man Timb 22 Mason Burma and its People 480-82 751 Jour Agri Hort Soc Ind X (old series) pro cxxi Balfour, Cyclop I 1175 Indian Forester XI 393*

Habitat — An evergreen tree of the forests of Pegu and Tenasserim ascending to 4 000 feet

GUM

32

Gum Resin — *Mason* and later *Kurz* have both described this tree as yielding a superior kind of Gamboge so similar to the Gamboge of commerce that the former writer considered it identical He wrote 'In its appearance to the eye and in its properties as a pigment I have failed to discover the slightest difference between the exudation of this tree and the Gamboge of commerce It readily forms an emulsion with waterAn interesting account is given in the *Agri Horticultural Society's Journals Vol X* (old series) of an analysis of a gamboge obtained from a tree in Burma, called *Tanatan* (probably a misprint for *Tanatau* the vernacular name of this species) *Mr D Hanbury* the analyst writes 'I find this gum resin to be in its chemical characters precisely like the ordinary Siamese gamboge it is however much mixed with impurities and is in fact but rudely prepared If carefully collected and cast in bamboos (like the Siam drug) I cannot but think that it would equal the finest gamboge we get'

DYE

33

Dye — *Mason* states that the Burmese priests occasionally employ the gamboge obtained from this species to dye their robes and the Karens to colour their thread and that it serves equally well as a pigmentMEDICINE
Gum resin

34

Medicine — The GUM RESIN is occasionally though not extensively, employed as a medicine by Burman native practitioners (*Mason*)

TIMBER.

35

Structure of the Wood — White soft

36

G indica, *Chois , Fl Br Ind , I , 261 Wight, Ill I , 125*COCUM or KOKAM BUTTER MANGOSTEEN OIL, BRINDONIA TALLOW
Eng BEURRE DE COCUM, HUILE DE MADOOL, Fr , BRINDÃO, Port

G 36

Kokam Butter

(J Murray)

GARCINIA
indica.

Syn—G PURPUREA, Roxb G CELEBICA Desrouss BRINDONIA INDICA
Dupetit Th

Vern—Kokam kokam ká-tél (the oil), HIND Rátambi, kokamb, DEC ;
Kokam, amsál (the fruit) kokam chatel (the oil) ratambu-sála (the
bark) BOMB ; Bhurand chvrand kokam katambi amsál, rátambi (fruit)
bhirandel (oil), MAR Kokan Guz Múrgal mara TAM Rátambi
KONKAN ; Múrgala, múrgal margina-huli mara dhupads-ennd (the oil)
KAN Brindáo, GOA.

References—Roxb Fl Ind Ed C B C 443 Beddome, Fl Syls Gen
xxi For Man, xx Gamble Man Timb 22 Dals & Gibs
Bomb Fl 31 Grah Cat Bomb Pl, 25 Pharm Ind 31 Moodeen
Sheriff Supp Pharm Ind 146, Mat Med Madras, 42 Dymock Mat
Med W Ind 2nd Ed 78 Pharmacog Indica, 1 163 Flück &
Hanb, Pharmacog 86 Bent & Trim Med Pl 32, S Arjun, Bomb
Drugs 199 23 Murray Pl and Drugs Sind, 68 Fleming Med Pl
& Drugs in As Res Vol XI 188 Lisboa, U Pl Bomb 10 146 213
241 Birdwood Bomb Pr 14 218 278 Cooke Oils and Oilseeds 13 ;
Voyage of John Huyghen van Linschoten 1596, 11 34 Agri Hort Soc
India Trans VII 75 Journ (old series) IV 204, As Soc Beng
Journ II 592, Spons Encycl II 1395, Balfour, Cyclop I 1176
Kew Reports 1881 13 Kew Off Guide to the Mus of Ec Bot, 16 Kew
Rep, 1882 13, Indian Forester, XI 328 Gazetteers—Bombay XIII
pt I 25 XV pt I 70, XVIII 57 Home Dept Cor regarding
Pharm Ind 307, Madras Board of Rev Procs June 1st 1889 No 4
Special Reports from F C Osanne Esq Bombay 1886 and 1889, Con
servators of Forests Northern and Southern Circles Bombay Conser
vator of Forests S Circle Madras

Habitat.—A slender tree with drooping branches found on the Gháts
of the Konkan and Kanara most commonly in the Southern Konkan and
considerably cultivated in gardens of that district It bears a conspicu-
ous spherical purple fruit, the size of a small orange which ripens
about April

Dye—The juice of the FRUIT has long been employed as a mordant by
dyers in South Western India. Thus Linschoten in his *Voyage to the East
Indies* in 1596 noticed the fact mentioning that the dyers do use this
fruit Lisboa states that it is chiefly employed as a mordant with iron

Oil—A valuable oil Kokam butter is obtained from the SEEDS of the
fruit to the extent of about 30 per cent The process of preparation is
described in an interesting communication by the Director of Land Records
and Agriculture Poona as follows — The oil or butter as it is called is,
as a rule extracted in the cool season by one of three methods 1st *Boil-
ing process*—The seed is cracked and the shell removed The white
kernel is then pounded in a large specially made stone mortar by a cone-
shaped pestle The pulp is put into an earthen or iron pan with some
water and boiled After some time it is poured out into another vessel
and allowed to cool The oil which rises to the surface on cooling becomes
gradually solid and is roughly moulded by hand into egg shaped balls or
concavo-convex cakes 2nd *Churning process*—The kernel is pounded as
described above and the pulp with some water is kept in a large vessel and
allowed to settle for the night During the night the oil rises to the surface
and forms a white layer which is removed in the morning The mixture
is then churned and the oil which like butter rises to the surface in a
solid form is removed by the hand This process gives the best results,
and is most favourably performed in the cold season, 3rd, *Pressing pro-
cess*—In this process the kernels are pressed in an ordinary oil mill like
other oil seeds and the oil is extracted

DESCRIPTION AND CHEMICAL COMPOSITION—Kokam butter, as found
in the bazárs of India consists of egg shaped or concavo-convex cakes of
a dirty white or yellowish colour friable, crystalline, and with a greasy feel
like spermaceti When fresh it has a faint, not unpleasant, smell, and a

DYE
Fruit.
37

OIL,
Seeds
38

CHEMISTRY
39

**GARCINIA
indica.****Kokam Butter****CHEMISTRY**

bland oily taste. It melts in the mouth like butter, and leaves a sensation of cold on the tongue. When long kept it is apt to become rancid, and acquires a browner colour, while an efflorescence of shining tufted crystals appears on the surface of the mass. As ordinarily met with, it contains a considerable amount of impurity, chiefly particles of the seed. As above stated the purest quality is that obtained by the second process (churning). By filtration under the influence of heat it may be obtained perfectly pure in which condition it is quite transparent, and of a very light yellowish colour but at lower temperatures it becomes white and crystalline. The butter of commerce melts at about 40°C. Flückiger and Hanbury give the following account of its chemical composition: "Purified kokám butter boiled with caustic soda yields a fine hard soap which, when decomposed with sulphuric acid, affords a crystalline cake of fatty acids weighing as much as the original fat. The acids were again combined with soda and the soap having been decomposed, they were dissolved in alcohol of about 94 per cent. By slow cooling and evaporation crystals were first formed which when perfectly dried melted at 69.5°C. they are consequently Stearic acid. A less considerable amount of crystals which separated subsequently, had a fusing point of 55° and may be referred to Myristic acid. A portion of the crude fat was heated with oxide of lead and water and the plumbic compound dried and exhausted with ether which after evaporation left a very small amount of liquid oil, which we refer to oleic acid." It contains no volatile fatty acid.

**HISTORY
40**

HISTORY—Kokam butter has doubtless been employed by the Natives of at least South Western India since remote times, but it does not appear to have attracted the notice of Europeans till about the year 1830. In 1833 a writer in the Journal of the Asiatic Society of Bengal described its employment medicinally by the Natives and advocated its trial by Europeans. It was adopted as official during the compilation of the *Indian Pharmacopœia* in 1868, and is now generally recognised as a solid oil of considerable value.

**MEDICINE
Fruit
41**

Medicine—The **FRUIT** has been long employed in South Western India as a semi-medicinal article of diet. The authors of the *Pharmacographia Indica* state that its virtues were first recognised by the English at the end of the eighteenth century when it was employed as an anti-scorbutic in the Bombay Army. It is acid, slightly astringent and is considered by native physicians to be superior to tamarind for the preparation of acidulous drinks. Dymock states that the apothecaries of Goa prepare a very fine red syrup from the juice of the fruit, which they administer in bilious affections. "The **OIL** or Kokam butter already described is considered demulcent, nutrient and emollient. Moodeen Sheriff in his forthcoming work on the *Materia Medica* of Madras writes, 'I have used it internally in my practice and have found that its best medicinal properties are its usefulness in phthisis pulmonalis and some scrofulous diseases, and in dysentery and mucous diarrhoea. In the former its action is something like that of cod liver oil, of which it is a pretty good and very cheap and pleasant substitute, and in the latter it is of great service in relieving tormina and tenesmus when employed as an adjuvant to other medicines.' He recommends doses of from $\frac{1}{2}$ to 1 ounce as a nutritive tonic in place of cod liver oil, and 1 to 2 drachms as an emollient adjuvant to other drugs in dysentery and mucous diarrhoea. It is employed externally by the natives as a remedy for excoriations, chaps, fissures of the lips, &c., by partly melting it and rubbing the affected part. It was introduced into the *Pharmacopœia*, however, chiefly with the purpose of bringing it into use for the preparation of ointments, suppositories, and other similar preparations. Dymock considers it an excellent substitute for spermaceti, and recommends its employ

**OIL
42**

Kokam	(J Murray)	GARCINIA indica.
<p>ment with equal parts of lard in the preparation of nitrate of mercury ointment The BARK is said to be astringent, and Dymock mentions that the ' YOUNG LEAVES after having been tied up in a plantain leaf and stewed in hot ashes are rubbed in cold milk and given as a remedy for dysentery "</p>		<p>MEDICINE Bark 43 Young leaves. 44</p>
<p>SPECIAL OPINIONS —§ 'Kokam' is a useful application in the fissures of the skin of the feet so common among natives in the cold weather" (Surgeon Major H W E Catham, M D, Ahmednagar) 'The fruit is made into a sherbet and as such is useful in fever as a cooling drink It is also anti scorbutic (Surgeon Major A S G Jayakar Muskat) "Half an ounce of kokam butter melted and mixed with a little boiled rice is used in dysentery The dose is repeated once daily ' (Surgeon James McCloghry Poona)</p>		<p>FOOD Fruit 45</p>
<p>Food —The purple FRUIT has an agreeable flavour and has long been esteemed as an article of diet It is mentioned by Garcia DeOrta (1563) as known to the Portuguese of Goa by the name of <i>Brindones</i> A little later (1566) Paludanus wrote in connection with Linachoten's note regarding the fruits of India "There is also in East India a fruit called <i>Brindosjus</i> which outwardly is a little red and inwardly bloud red verye sowre of taste There are some also that are outwardly blackish which proceed eth of the ripenesse and not so sowre as the first but yet as red within Many Indians like well of this fruit but because of its sowreness it is not so well accepted of The barks of these trees are kept and brought over sea (hither and are good) to make vinegar withall as some Portingales have done' The last statement is interesting as if correct this utilisation of the bark appears to have fallen entirely into disuse In Vol X of the <i>Bombay Gazetteer</i> it is stated that 'In the Collector's garden in Ratnagiri some trees said to have been grafted from plants brought from the Straits yield delicious fruit just like the imported mangosteen By the natives however the fruit is chiefly employed in the form of a preparation called <i>kokam</i> which is prepared as follows 'When the fruit begins to ripen it is gathered and kept in shade for three or four days to ripen completely after this it becomes soft and pulpy the outer skin is removed and dried in the sun The seeds and pulpy substance are then put in a bambo basket, which is kept in a boat shaped wooden trough The juice is allowed to trickle down the basket for some time into the trough, and when it ceases to trickle the seed and pulp are stirred and pressed by the hand, and the whole juice is drained off into the trough The pieces of the outer skin as they are dried are dipped into the juice and again dried in the sun In this way they receive three or four coatings of juice The pieces of rind are now ready for use and are stored in bamboo baskets Sometimes a little salt is added to the juice. In Goa the pulp is sometimes made into large globular masses There are very few separate establishments to prepare <i>kokam</i>, the preparation being generally left to the women of a family They keep as much as is wanted for the household and sell the rest to the village grocer who in his turn disposes of it to the exporter' 'The seeds after being thoroughly dried, are stored for the four rainy months to be used in the preparation of <i>kokam</i> butter and to guard against the attacks of weevils and other insects soft ashes are sprinkled over them as they are being dried in the sun" (Report from Director of Land Records and Agriculture Poona)</p>		<p>COMPOSITION 46</p>
<p>In the same interesting communication it is stated that the <i>kokam</i> or dried rind is largely used in the Southern Konkan as an ingredient of curries, taking the place of tamarind while in other parts of Bombay it is principally employed as a semi medicinal diet</p>		
<p>CHEMICAL COMPOSITION OF KOKAM —Dr Lyon of Bombay has analysed the prepared rind and found it to contain neither tartaric nor citric</p>		

**GARCINIA
Mangostana****Kokam, Mangosteen.****COMPOSITION
OF KOKAM**

FOOD
Oil
47
Young leaves
48
Seed.
49

TRADE
50

**INDUSTRIAL
USES**

Candles
51

MANURE
Oil cake
52
53

FOOD
Fruit
54
55

acid, but 13.53 per cent of malic acid. The hot water extract formed 42.9 per cent, and the ash 7.88 per cent of which 5.92 per cent was soluble in water. The alkalinity of the ash calculated as potash was 79 per cent.

The concrete oil is occasionally employed in native cookery, and is said to be largely used in Goa for the purpose of adulterating *Ghi*, a statement which is, however, contradicted by Dymock. Rumphius mentions that the YOUNG LEAVES were employed in Amboyana in cooking fish. The Collector of South Kanara, in a communication to the Government on the subject, published in 1889, states that 'the SEED of the ripe fruit is swallowed raw by the natives as a delicacy.'

Trade—The average annual value of a full crop from a well grown tree is said in the Southern Konkani to amount to ₹7, and in the same locality the *Kokam* sells at 35 lb per rupee, and the oil at 6 to 8 lb per rupee (*Dir Land Rec and Agric Poona*). Dymock states that the dried fruit obtained in Bombay comes principally from Goa, Hingoli, and Malwan, and is sold for ₹40 per kandy of 28 Bombay maunds of 28 lb each, while the *Kokam* butter, which is principally obtained from Goa, fetches ₹5 to 7 per Surat maund of 37½ lb. A small quantity of the latter is annually exported from Bombay, but the quantity cannot be accurately ascertained, since for statistical purposes it is not registered separately from other sorts of vegetable oils.

Industrial and Agricultural Uses—*Kokam* butter yields stearic acid in larger quantities, more easily, and in a purer state than do most other fats, and therefore appears to be particularly suitable as a substance for candle-making. The learned authors of the *Pharmacographia* comment on this fact, writing, 'But that it is possible to obtain it in quantities sufficiently large for important industrial uses appears to us very improbable.' In connection with this remark it is worthy of notice that the Director of Land Records and Agriculture, Poona, states that in Ratnagiri alone the number of trees is estimated at 13,000, and that they abound in other parts of the Southern Konkani. It therefore appears that the supply need not be so limited as Flückiger and Hanbury supposed, and that the preparation of *Kokam* butter may be an industry capable of considerable and profitable development.

MANURE—The OIL CAKE obtained as a by-product in the preparation of the concrete oil is considered excellent manure.

Garcinia lanceaefolia, Roxb., Fl. Br. Ind., I, 263, Wight, Ic., t. 163

Syn.—*GARCINIA PURPUREA* Wall, Cat., 4862 and Choisy (not of Roxb.)

Vern.—*Kirindur* SYLHET

References.—*Roxb. Fl. Ind., Ed. C.B.C. 442; Kuhn, For. Fl. Burm., I, 91; Gamble, Man. Timb., 22; Balfour, Cyclop., I, 1176; Agri. Hort. Soc. India Trans. VII, 75; Journal (Old Series) IV, 204.*

Habitat—A small tree with dark rough bark inhabiting the forests of Assam and Sylhet. It flowers in February and the fruit ripens in July.

Food.—Roxburgh states that it is cultivated by the natives of Sylhet for its FRUIT of which they are fond.

G Mangostana, Linn. Fl. Br. Ind., I, 260

THE MANGOSTEEN

Vern.—*Mangustán* HIND; *Mangustán* BENG; *Mangostín* mangustan BOMB; *Mangastín* MAR; *Mangusta* MALAY; *Mangkop* mambu mengut mangkob younggalai BURM; *Manggis* MALAYS

References.—*Roxb. Fl. Ind., Ed. C.B.C. 441; Kuhn, For. Fl. Burm., I, 87; Gamble, Man. Timb., 22; DC. Origin Cult. Pl., 188; Mason, Burma and its People, 447; 750; Pharm. Ind., 31; O'Shaughnessy, Beng. Dispens., 236; Moodeen Sheriff, Suppl. Pharm. Ind., 145; Dymock, Mat. Med. W. Ind., 2nd Ed., 82; Pharmacog. Ind., I, 107; U.S. Dis-*

The Mangosteen.

(J Murray)

GARCINIA
Mangostana

pens 15th Ed 281, *S Arjun*, Bomb Drugs 23 *Year Book Pharm* 1873 285 *Lisboa*, U Pl Bomb 146, *Birdwood Bomb Pr*, 14, 142; *Cooke*, Gums and Gum resins 41 *Smith Dic*, 263; *Kew Reports*, 1871 91 *Kew Off Guide to the Mus of Ec Bot* 16 *Kew Off Guide to Bot Gardens and Arboretum* 71 *Agri Hort Soc Ind Trans* —II (App) 209 *V Pro* 38 *VI* 127 *Pro* 112; *VII* 75 108 *Journ VII*, 72 *Special Reports from Conservators of Forests, Burma and of S Circle Madras* *Burma Gazetteer* 11 230 *Settlement Report Port Blair* 1870-71 33 42

Habitat.—An evergreen tree native of the Straits cultivated in British Burma on account of its fruit. Of recent years it has also been successfully cultivated at a few places in the Madras Presidency. The attempts made by Roxburgh in Bengal and by several individuals in Bombay to introduce this fruit tree into these presidencies have been unsuccessful. The former observes. The plant has uniformly become sickly when removed to the north or west of the Bay of Bengal and rarely rises beyond the height of two or three feet before it perishes. De Oandolle remarking on the poor results which have followed attempts to familiarize the mangosteen to other countries than those in which it naturally occurs writes. Among cultivated plants it is one of the most local both in its origin habitation and in cultivation. It belongs it is true to one of those families in which the mean area of the species is most restricted."

Cultivation in India.—The mangosteen is extensively cultivated in Southern Tenasserim and as already remarked has of late years been successfully introduced into Madras. A congenial amount of heat and moisture throughout the year seems to be necessary for its successful cultivation a condition which on the main peninsula appears to be met with in the Madras presidency only. Recent reports from the Madras Government contain the information that its cultivation in the hot valleys to the east of the Nilghiris has proved successful while attempts made in the open plains have resulted in failure. The Conservator of Forests Southern Circle further reports (May 1889) that one tree in the Government Gardens at Burliar on the Nilghiris produced a hundred dozen fruits also that a considerable number of young plants have recently been distributed from Ootacamund but that they are still too young to bear fruit.

Gum resin.—Kurz mentions that this species exudes gamboge of inferior quality. A specimen sent to the London Exhibition in 1862 from Malacca, somewhat resembling gamboge externally was in small semi opaque smooth rounded tears, but would not easily form an emulsion and could not be used as a pigment (*Cooke*). O'Shaughnessy states that he obtained small quantities of fine gamboge from the rind of the fruit.

Dye & Tan.—The RIND is employed in combination with the fruit of *Terminalia Catappa*, Linn for dyeing black and is also said to yield a valuable tan.

Medicine.—The dried RIND or ENTIRE FRUIT is largely employed by natives as a remedy for diarrhoea dysentery and affections of the genito-urinary tracts. According to Rumphius the BARK and YOUNG LEAVES are employed by the Macassars for the same purposes, and also as a wash for aphthæ of the mouth. The *Pharmacopœia of India* includes 'the thick fleshy pericarp' amongst its non-official drugs, the Editor remarking that he has found it of manifest advantage when administered with aromatics in cases of advanced dysentery and chronic diarrhoea. A strong decoction has also been recommended as an external astringent application (*Watts*). This fruit, prepared like kokam is said to have come into use of late years in European medicine as a substitute for Bael.

Chemical Composition.—An analysis made by Schmidt in 1855 proved that the rind contains tannin, resin and a crystallizable principle man

CULTIVATION
56GUM-RESIN
57DYE
Rind.
58
TAN
59
MEDICINE.
Fruit.
60
Bark.
61
Young leaves
62CHEMISTRY
63

**GARCINIA
Morella.****The Mangosteen The Gamboge Tree.**

gostine As the physiological actions of the two latter constituents have not as yet been separately studied it is impossible to say whether the effect caused by the drug is due simply to the tannin it contains, or whether the *resin* and *mangostine* may not possess peculiar therapeutic properties. The unanimity of opinion as to the efficacy of Mangosteen rind, evidenced in the following special opinions would seem to indicate that it is a remedy of decided value, and that it probably does possess some property in addition to the simple astringency of tannin.

SPECIAL OPINIONS—§ 'The powder of the dried rind has been administered in intermittent fever with varying success' (*Honorary Surgeon P Kinsley Chicacole Ganjam Madras*) The rind contains a good deal of tannic acid. In fine powder it is largely and effectively used in Burma for diarrhoea and dysentery but I found it very efficacious in diarrhoea only. A wine of mangostin (31 to 31) is the best method of administration dose for an adult $\frac{1}{2}$ dr to 31' (*Devendro Nath Roy Campbell Medical School, Calcutta*) 'The rind is used with benefit in cases of chronic diarrhoea in children (*Bolly Chund Sen Campbell Medical School Calcutta*) A decoction of the rind is a good astringent in chronic dysentery and diarrhoea' (*Surgeon D Picachy Purneah*) This fruit is brought here in large quantities from the Straits Settlements in July and annually Natives suffering from gonorrhoea and gleet use it largely as it lessens urethral irritation and the discharge is in many instances completely arrested. It is therefore classed by them as a cooling and refrigerant fruit. A small quantity of the rind steeped over night in cold water and taken in the early morning as a draught is a valuable remedy for long standing diarrhoea both in adults and children (*Honorary Surgeon A E Morris Tranquebar*)

Food—The **FRUIT** is highly esteemed both by Europeans and Natives and is indeed considered by many to be the most palatable of fruits. It is about the size of a small apple with a thick succulent astringent rind of a reddish brown colour externally but bright crimson on section. Within this are placed the 4 to 12 large seeds each surrounded with its juicy white aril sweet and acidulous, with a delicate flavour like the odour of the primrose.

Trade—A large quantity of the fruit both fresh and dried is annually imported from the Straits and may be purchased on the streets of Calcutta in small baskets though it is customary to find the fruits of *Achras Sapota* passed off on the ignorant as Mangosteens. The fruit comes into season in May and June.

FOOD
Fruit.
64

TRADE
65

66

Garcinia Morella, Desrouss, Fl Br Ind, I, 264, Wight Ic, II
THE GAMBOGE TREE [102, 120]

Syn—*GARCINIA LOBULOSA* Wall; *G. PICTORIA* Roxb; *G. ELLIPTICA* Wall (in part); *G. ACUMINATA* Planch & Trian; *G. GUTTA* Wight; *G. CAMBOGIODES* Royle; *HEBRADENDRON CAMBOGIODES* Graham.

Vern—The tree=*Tamál* the drug=*ghótághauba gótá gambá tamál*, HIND the tree=*Tamál* the drug=*tamál* BENG the drug=*Ausarahe-ruvan* DEC, C P the tree=*Tamál* the drug=*revachinnisrd tamál* MAR the drug=*Makhi ríval-chinip-pál* the oil=*makhi TAM* the drug=*Rívalchinip-pál* TEL the tree=*Arsinagurgí mara aradál punar puli* the drug=*Tamál KAN* the tree=*Darámba* MALAY; the tree=*Tha-men-gát*, the drug=*sanato sí tanato asi* the oil=*parawa ballawa* BURM; the drug=*Gotakú, gotakú-melhyam kanagoraka*, SING; the drug=*rubbi-revánd aushdre révand jarfrán* ARAB and PERS. The literal meaning of the above Arabic Persian Hindustani Dekhani Telugu and Mahratti synonyms for the gum-resin is explained by **Moodeen Sheriff** to be the juice or extract of *Rhubarb* but they have become according to the usages of the languages the correct names of **Gamboge**.

The True Gamboge Tree.

(7 Murray)

**GARCINIA
Morella.**

References.—*Roxb, Fl Ind, Ed C B C 444. Beddome Fl Sylva, it 86 & 87; Gamble Man Timb 24, Thwaites, En Ceylon Pl, 49, Hooker in Journ Linn Soc Lond, XIV, 485. Hanbury Trans Linn Soc XXIV, 487 t 50. Mason Burma and its People 397 482 483 534 & 751. Ainslie, Mat Ind I 147 602. O'Shaughnessy Beng Dispens 235. Moodeen Sheriff Supp Pharm. Ind 83, 145. Mat Med of Madras, 40 41. Dymock Mat Med W Ind and Ed 83. Pharmacog Indica Pt I 168; Flück & Hanb Pharmacog 83. U S Dispens 15th Ed 327. Bent & Trim Med Pl 33. S Arjun Bomb Drugs 23. K L Dey Indig Drugs of India 56. Med Top Ajmir 148. Irvine Mat Med Patna, 29. Drury U Pl 221. Birdwood, Bomb Pr, 14. Cooke Gums and Gum-resins 43 46. Cooke Oils and Oilseeds, 13. Watson Report on Gums 14. 34, 67. Watts Dic of Chemistry (Ed 1882) II 770. Milburn's Oriental Commerce Ed 1825 483; Spens Encyclop 1551 1651. Balfour Cyclop I 1176. Smith Dic 189, Kew Off Guide to the Mus of Ec Bot 16, Indian Forester II 20 VI 125 XI 327 392. Agri Hort Soc of India Trans V 41 75 79 pro 40; VI 127 VII 76; Journ, II Sel 377 VIII Sel 140, X pro 121, Gazetteers—Bombay XV 56 70. Mysore and Coorg I, 46 68 III 16; Special Report from Conservator of Forests S Circle Bombay 1888.*

Habitat.—A small evergreen tree found in the forests of Eastern Bengal the Khásia Mountains the Western Peninsula (Malabar and Kanara) the Eastern Peninsula (Malacca and Singapore) also in Ceylon and Siam *Garcinia pictoria*, *Roxb* is considered by *Beddome* to be distinct from this species but in the *Flora of British India* it has been reduced as a synonym.

Gum Resin.—This species produces the true Gamboge of medicine and of the arts. The chief trade supply is obtained from Siam in the form of cylindrical pieces or sticks. Until very recently the exact source of the Gamboge of Commerce was obscure the gum resin of Siam being referred to *Garcinia cochui sinensis*, and that of Ceylon to *Hebradendron cambogioides* while that of Southern India was supposed to be the produce of *G. pictoria*. These have now however been reduced to one species namely *G. Morella*, *Desrouss* so that the gum resins of the Malay Peninsula, India, Ceylon and Burma may be considered one and the same.

HISTORY.—According to the learned authors of the *Pharmacographia* Gamboge was known to the Chinese as early as the end of the thirteenth century but was employed by them almost entirely as a pigment. *Pereira* states that the first notice of the occurrence of the gum resin in Europe is in the writings of *Olusius* (1605) who received it in Amsterdam from a Dutch traveller. Its medicinal virtues were quickly recognised as is evidenced by the fact that records exist of its use by *Reuden* a physician of Bamberg as early as 1611. In 1615 a considerable quantity was offered for sale in London by the East India Company the entries in the Court Minute Book describing it as 'Cambogium a drug unknown here' 'a gentle purge' (*Fluckiger and Hanbury*). Notwithstanding the fact that Gamboge has for many years formed an important article of commerce, there appears to be no doubt that it has never been collected in India as an article of trade even in the districts where the tree abounds. Thus in the Report on the Destruction of Tropical Forests by a committee appointed to investigate that subject in 1851, the following paragraph appears. The Coorg or Wynád gamboge tree has an extensive range we have seen it along all the higher parts of the Malabar Gháts for fully 120 miles from north to south, and in some parts it is very abundant yet the produce for the most part is made little use of, and the tree is considered of so small value that we have seen the supports and scaffolding of bridges, &c entirely composed of the stems of *Garcinia pictoria* (*Agri Hort Soc of India Journal VIII (Old Series), Sel 140*).

The gum resin of Burma, however has long been used as a yellow dye for the silk robes of the Buddhist priests, and Dr Dymock states that

GUM RESIN
67HISTORY
68

**GARCINIA
Morella****The True Gamboge Tree****HISTORY**

' the juice of the tree under the Sanskrit name of *Tamdla* has long been employed as a pigment for making sectarian marks on the forehead by the Hindus of Kanara and Mysore Towards the middle of the present century specimens of Gamboge procured from Indian trees were carefully analysed and critically compared with pure Siam gamboge by chemists both in this country and in England with the result that the two were declared to be practically identical Notwithstanding this no attempt appears to have been made to collect the exudation free from impurities, and in such a state that it could compete with success with the pure pipe gamboge ' from Siam

**COLLECTION
69**

COLLECTION — The gamboge of commerce, which is imported into Europe from Singapore Bangkok and Saigon and is the produce of Siam Cambodia and the Southern parts of Cochin China is collected in the following way At the commencement of the rainy season a spiral incision is made in the bark round half the circumference of a full sized tree and the juice which then slowly exudes for several months is received into a joint of bamboo which is placed at the lower end of the incision for that purpose When the juice has hardened the shell of bamboo is removed, and the gamboge is thus obtained in the form of a roll or cylinder ' (constituting the *Roll* or *Pipe Gamboge* of commerce) According to **Spencer St John** a tree will yield on an average in a season sufficient gamboge to fill three joints of bamboo 20 inches in length by about 1½ inches in diameter The trees should be incised in alternate years (*Bentley & Trimen*) *'Cake'* or *Lump Gamboge* is obtained either from a similar incision or by breaking the leaves and twigs the yellow juice which exudes being collected either on the leaves of the tree or in cocoanut shells A slightly different account is given by **Flückiger** and **Hanbury** quoting **Dr Jamie** of Singapore The best time for collecting is from February to March or April The trees the larger the better are wounded by a *parang* or chopping knife in various parts of the trunk and large branches when prepared bamboos are inserted between the wood and the bark of the trees The bamboo cylinders being tied or inserted are examined daily till filled which generally takes from fifteen to thirty days Then the bamboos are taken to a fire, over which they are gradually rotated till the water in the gum resin is evaporated, and it gets sufficiently hard to allow of the bamboo being torn off ' These methods appear to have been untried in India, answers from forest officers to questions regarding the amount collected and methods of preparation shewing that as a rule minute incisions only are made from which small tears of the gum resin are obtained In Ceylon it is usually collected by cutting a thin slice of the size of the palm of the hand off the bark here and there On the flat space thus exposed the gum collects and is scraped off when sufficiently dry As a consequence only cake gamboge or the gum resin in small particles is obtained both of which forms are always much less pure than the Siam pipe gamboge The District Forest Officer of North Malabar reports that by making small incisions in the bark of a tree 16 inches in diameter ½ lb of first class pigment was obtained, but the method appears much more laborious less productive and more liable to result in the admixture of impurities than that of collecting in bamboos A consideration of the literature on the subject indicates the advisability of giving the Siam method at least a fair trial

Another method is reported from Madras, which consists in partially stripping the bark, pounding and boiling it straining the resulting liquor and inspissating it over a slow fire This necessarily laborious and expensive process is said to yield an inferior article though in large quantities But since gamboge to be of commercial value must be pure and as the pure

The True Gamboge Tree

(F Murray)

**GARCINIA
Morella.**

article can be obtained by the bamboo method much more readily and cheaply the experiment above described might naturally have been expected to prove-unprofitable

DESCRIPTION AND CHEMICAL COMPOSITION—The 'pipe' gamboge of commerce is found in the form of cylinders 1 to 2½ inches in diameter and 4 to 8 inches in length with striations lengthwise caused by impressions from the inside of the bamboo used in collecting. These cylinders may be distinct and covered externally with a yellowish brown dust or may be agglutinated into masses of various sizes. The best samples are of a rich brownish orange colour externally dense and homogeneous brittle with a conchoidal fracture of an opaque reddish yellow colour odourless and tasteless at first then acid. Mixed with water or wetted by the finger they form at once a yellow emulsion. The powder of pure gamboge is fine yellow. The more impure forms of pipe gamboge, and lump or cake 'gamboge', contain starch fragments of leaves twigs, &c and are harder and more earthy in fracture than the pure gum resin. The specimens of Indian gamboge which have been examined have been as a rule in tears or in irregular fragments collected on leaves, and have varied much in character. The authors of the *Pharmacographia Indica* state that in a specimen they recently examined obtained from South Kanara the finer pieces had the colour and consistence of Siam gamboge but contained many impurities while fully half the sample was of a dirty yellow brown colour and had a spongy structure caused by admixture with a substance which appeared to be chlorophyll. There is no doubt however that the gum resins of Siam and India are identical and that the adoption of the method of collection practised in the former country would result in an equally valuable product.

Chemically gamboge consists of a mixture of resin with 15 to 20 per cent of gum. The resin dissolves easily in alcohol forming a clear liquid of a fine yellowish red hue and acid reaction. Buchner assigns to it the formula $C_{60}H_{55}O_{12}$. Flückiger and Hanbury state that the gum (which they obtained to the extent of 15.8 per cent by completely exhausting the gum resin with alcohol and ether) was found to be readily soluble in water not acid in reaction and therefore not identical with gum arabic. As already stated impurities are of common occurrence—rice-flour sand or the pulverised bark of the tree being amongst the most common. These mechanical impurities are readily recognised in the residue left after exhausting the gum resin while the starchy adulterants are easily detected by adding a solution of iodine to the decoction, a green colour being produced.

Dye and Tan—The GUM RESIN is employed by the Burmans for dyeing silks of a yellow colour and by the Karens for their thread. The RIND OF THE FRUIT may be employed as a tan. As already stated gamboge is employed by the Hindus in parts of India as a pigment in making caste marks on the forehead. In Europe it is largely used as a pigment especially for water colour drawing.

Oil—A semi solid fat of a yellow colour is procurable in moderate quantities from the SEEDS by similar processes to those followed in the preparation of *Kokam* butter. Ooke states that two and a half measures of seed should yield one seer and a half of butter and that in the Nagar District of Mysore it is sold at the rate of 1 to 4 annas per seer of Rs 24 weight or at £36 a ton. It is employed as a lamp oil by the better classes of natives and as a substitute for *ghi* by the poor. No reliable analysis of this fat is obtainable but should it like that obtained from the allied species *G. indica*, *Chois*, contain a large proportion of stearic acid it might prove of value to the candle-maker.

CHEMISTRY
70**DYE**
Gum-Resin.
71
TAN
Rind
72**OIL**
Seeds
73

**GARCINIA
pedunculata.****The Garcinias or Gamboge Trees.****MEDICINE**
Gamboge
74**Branches.**
75**FOOD**
Oil
76
TIMBER
77
DOMESTIC
Oil
78
TRADE
79
80**FOOD**
Fruit
81
82**DYE**
Fruit.
83

Medicine.—**GAMBOGE** is largely employed as a hydragogue and drastic cathartic and anthelmintic. It is particularly valuable in cases of ana sarca and other dropsical affections, and in obstinate constipation. In over doses it is a violent gastro intestinal irritant poison and ought to be administered with caution, especially to children. When prescribed alone it is liable to cause severe griping and is therefore almost always given in combination with other purgatives and carminatives. **Moodeen Sheriff** states that Mysore gamboge must be given in half larger doses than the official drug doubtless because it contains a proportion of inert impurities. It is also employed by the natives as an external application to relieve pain and swelling, and **Dr Gray** reports that broken pieces of the **BRANCHES** rubbed up with water are used as a household remedy for boils.

SPECIAL OPINIONS—§ **Siam gamboge** is one of the best purgatives in India and a much stronger drug than jalap. Like the latter it acts very satisfactorily in combination with other purgatives or laxatives but not so well when used alone. During the last twenty years I have used this medicine in Triplicane Dispensary with cream of tartar, whenever jalap was out and never felt the want of the latter. The cheapness and abundance of Siam gamboge in this country is another advantage which it possesses over jalap (*Honorary Surgeon Moodeen Sheriff Khan Bahadur Tripl cane Madras*) 'Mixed with other medicines and applied over sprains and contusions it relieves pain and swelling' (*Surgeon Major A S G Jayakar Muskat*). The stem rubbed with water is a household remedy amongst natives as a local application to rising pimples and boils, and often cuts them short' (*Civil Surgeon R Gray Lahore*).

Food.—The **OIL** obtained from the seeds is employed by the poor as a substitute for *ghi*.

Structure of the Wood—Yellow hard mottled. Weight about 56lb per cubic foot. Might be useful for cabinet making.

Domestic Uses—The **OIL** is largely employed with that of **G indica**, *Choss*, for illuminating purposes.

Trade—In the Indian markets the ordinary pipe gamboge is alone met with, value **Rs 4 per lb** (*Pharmacographia Indica*).

Garcinia paniculata, Roxb Fl Br Ind, I, 266 Wight, Ic, t 112

Syn—**G BHUMICOWA Roxb**

References—**Roxb, Fl Ind Ed CBC 443 Kurs For Fl Burm I 92**

Habitat—A tree about 40 feet high native of the Khásia Mountains the Eastern Himálaya at Bhotán and of Chittagong.

Food.—"The **FRUIT** is palatable its taste more like that of a mangos than anything else I can compare it to" (*Roxburgh*).

G pedunculata, Roxb, Fl Br Ind I, 264 Wight, Ic, t 114, 115

Vern—**Tihál tihur BENG Borthekra kuy: thekera tenga ASSAM; Hei báng MANIPUR**

References—**Roxb Fl Ind Ed CBC 443 Drury, U Pl 221 A Note on the Condition of the People of Upper India Agric file No 6 1888 Trotter, Report on Ec Prod Manipur, Balfour, Cyclop I, 1176; Agri Hort Soc Indu —Trans VII 75 Journ (Old Series) VI 27 39 X, Pro 40**

Habitat.—A tall tree of the forests of North Eastern Bengal, near Rungpur and Goalpara, and of Sylhet. It flowers from January to March, and its fruit ripens from that time to June.

Dye.—**Major Trotter** in his report on the Economic Products of Manipur, stated that the **FRUIT** of this plant was largely employed by the natives of that country to deepen and render fast saffron dye. He described the process as follows: 'After the cloth has been dyed with saffron

The Garcinias or Gamboge Trees	(J. Murray)	GARCINIA succifolia.
<p>wring it out and lay aside for a few minutes, add $\frac{1}{2}$ of a pint of the <i>heibung</i> water (prepared very simply <i>vis</i>, by soaking $\frac{1}{2}$ seer of the fruit, cut in slices, in a pint of water for 20 to 24 hours) to the dye in the vessel, and mix thoroughly; then steep the <i>Golap Machoo</i> (saffron) cloth in it and press and flop it about till it is thoroughly saturated, then take out, wash in clean water and hang up in the shade to dry." No further information on this subject has been obtained, and it appears probable that the action of the <i>heibung</i> may be less complete than Major Trotter believed. It may be of interest however to note that Major Hannay in an article on the 'Rheas of Assam' mentions that "<i>Garcinia</i>" fruit (probably the fruit of this species) is employed to bleach rehea fibre in that country (<i>Four Agri-Hort Soc Ind, Vol VII (Old Series) 225</i>)</p>		DYE.
<p>Food—This tree yields a large, round, smooth yellow, edible fruit, regarding which Roxburgh writes — 'The fleshy part of the fruit which covers the seeds and their proper juicy envelope, or aril is, in large quantity of a firm texture and of a very sharp pleasant acid taste. It is used by the natives in their curries and for acidulating water. If cut into slices and dried it retains its qualities for years and might be most advantageously employed during long sea voyages as a succedaneum for lemons or limes to put into various messes where salt meat is employed &c</p>		FOOD Fruit. 84
<p>Structure of the Wood—The timber is said by Major Hannay to be useful when seasoned (<i>Note on some of the Forest trees of Upper Assam, Four Agri Hort Soc Ind VI (Old Series) 27</i>)</p>		TIMBER 85
Garcinia speciosa, Wall ; Fl Br Ind I, 260		86
Vern — <i>Palawa pa gayay theing</i> BURM		
References — <i>Kurz For Fl Burm I, 88 Gamble Man Timb 23 Mason Burma and Its People, 751</i>		
Habitat — An evergreen tree of Tenasserim Moulmein Martaban and the Andaman Islands		
Gum Resin — It is described by Kurz as yielding inferior gamboge		GUM-RESIN
Structure of the Wood — Uniformly reddish brown close grained very heavy weighing from 50 to 70 lb per cubic foot. It is employed for house and bridge posts and other purposes and is said to be used by the Andamanese to make bows. Kurz describes it as of equally good quality with the bullet wood of the Andamans		87 TIMBER 88
G stipulata, T And Fl Br Ind, I, 267		89
Vern — <i>Sana hadan</i> LEPCHA		
References. — <i>Gamble Man Timb 24 Balfour Cyclop I 1176</i>		
Habitat. — A tall tree met with in the moist sub-tropical forests of the Eastern Himálaya from Sikkim to Bhotán, ascending to an altitude of 4 000 feet		
Gum Resin. — The tree and fruit yield a yellow gum which does not seem to be used (<i>Gamble</i>)		GUM RESIN
Food — The fruit produced by this species is yellow, and is sometimes eaten by the Lepchas		90 FOOD Fruit 91 92
G succifolia, Kurz, For Fl Burm, I, 91		
The authors of the <i>Fl Br Ind</i> (I 270) regard this as a doubtful species owing to the female flowers and fruits being unknown. It is considered by Gamble to be identical with <i>G. loniceroides</i> , T Anders, <i>Fl Br Ind I, 264</i>		
References. — <i>Kurz Four As Soc Beng 1874 pt 2, 87; 1877, pt 2 203 Prelim For Rep on Pegu App A xiii</i>		
Habitat. — An evergreen tree from 30 to 35 feet in height, frequent in the swamp forests of the alluvial lands adjoining the Sittang and Irrawaddi rivers		

GARCINIA
Xanthochymus.**The Gamboge-yielding Trees****GUM-RESIN**

93

TIMBER.

94

95

Gum-resin.—This species is said by Kurz to yield little and inferior gamboge

Structure of the Wood—White turning yellowish white, rather heavy coarsely fibrous, very perishable (*Kurz*)

Garcinia travancorica, Beddome, Fl Br Ind, I, 268

Syn—*GARCINIA* sp, 2 *Beddome Flor Sylvat Gen* xxi

Vern.—*Malampongu* TINNEVELLY

References—*Beddome For Man* xxi *Fl Sylv* t 173, *Gamble Man Timb* 23 *Cooke Gums and Gum-resins* 48 *Balfour Cyclop I*, 1176 *Indian Forester* III 21

Habitat—A highly ornamental tree confined to the forests of the southern portions of the Travancore and Tinnevely Ghâts, at elevations of from 3 000 to 4 500 feet (*Beddome*)

GUM-RESIN

96

Gum resin.—*Beddome* states that every portion of the tree yields an abundance of bright yellow gamboge No information however regarding the chemical composition or physical characters of this gum resin is available and it is therefore not known to what extent it might be utilised as a pigment dye, or varnish

97

G Wightu, T And Fl Br Ind I 265

References—*Gamble Man Timb* 22 *Balfour Cyclop I* 1176

Habitat—A native of the forests of Southern India

GUM-RESIN

98

Gum resin—The gamboge of this species is very soluble and yields a good pigment (*T Anderson*)

99

G Xanthochymus, Hook f Fl Br Ind I 269

Syn—*XANTHOCHYMUS PICTORIUS* Roxb *X TINCTORIUS* DC

Vern.—*Dampel tamal** *HIND Tamal** *BENG Tepor tepur tihur*, *ASSAM Manho-la GARO Dampel onth osth BOMB*, *Yhárámá MAR Iwara memadi tamalamu chitukamraku TEL Mátáu BURM Ta mla** *SANS*

References—*Roxb Fl Ind Ed C B C* 445, *Wight & Arn, Prod I* 102 *Kurz For Fl Burm I* 93, *Gamble Man Timb* 23 *U C Dutt Mat Med Hind* 320 *Dymock Mat Med W Ind 2nd Ed* 81; *Pharmacog Indica I* 166 *Lisboa U Pl Bomb* 11 146 241 *Cooke Gums and Gum resins* 49 *Liotard Dyes* 95, *Darrah, Note on Cotton in Assam* 30 *Report on Dyes of Assam Balfour, Cyclop I*, 1176 *Indian Forester* XI 392

Habitat—A widely distributed species met with in Eastern Bengal the Eastern Himálaya from Sikkim to the Khásia Mountains, Burma, Southern India, Penang and the Andaman Islands

GUM-RESIN

100

Gum resin.—This species yields a large quantity of inferior gamboge both from the stem and fruit-rind *Roxburgh* states that it is of inferior quality but it is extensively utilised as a dye in Assam *Lisboa* describes the gum resin obtained from the fruit as follows From the full grown, but not ripe fruit a quantity of creamy resinous yellow gum like gamboge is obtained which makes a tolerably fair water colour, and might be used either by itself or mixed with blue to form green No definite account exists of the chemical and physical properties of this gum resin but it would seem to contain a larger proportion of gum than that derived from the other species

DYE**Bark**

101

Dye.—The BARK is employed by the Phakials of the Lakhimpur district of Assam for dyeing cotton The process which they employ is described by the Deputy Conservator of Forests of the province, as follows

* *U O Dutt* states that the above Sanskrit Hindustani and Bengali names are applied to this plant, as well as to *Cinnamomum Tamala, Nees*

The Garland Gardenia.

(J Murray)

**GARDENIA
CORONARIA.**

"Chips of the bark and the thread, with the leaves of *Symplocoa grandiflora* as a mordant, are boiled and the colour produced is a bright yellow. If the dye thus obtained be mixed with the blue derived from the leaves of *Strobilanthus flaccidifolia*, a green colour is produced." The dyeing property of the bark is doubtless due to the gum resin which it contains.

Medicine.—This species, like *G. indica*, produces a FRUIT which is employed medicinally either fresh or dried into a kind of *Amsul* (see *G. indica*). Dymock states that a sherbet made by mixing about 1 oz of this preparation with a little rock salt, pepper, ginger, cummin, and sugar is administered in bilious conditions.

Food.—The FRUIT is eaten. Lisboa writes "The fruit, temptingly beautiful as big as an orange, smooth and bright yellow, is however strongly acid, especially in the fleshy rind. The pulp, though less acid if eaten, puts the teeth out of order for a couple of days and is therefore, only used by poorer Natives."

Structure of the Wood.—Yellowish white, with a large darker-coloured heart wood, turning pale yellowish brown, rather heavy, fibrous but close-grained and fairly hard (*Kurs*).

GARDENIA, Linn, Gen Pl II, 89

A genus of shrubs or trees belonging to the Natural Order RUBIACEÆ and comprising about 60 tropical or sub-tropical species. Of these from 14 to 20 are natives of India.

Gardenia campanulata, Roxb Fl Br Ind, III, 118 Wight, Ic
[1 578, RUBIACEÆ

Syn.—*GARDENIA LONGISPINA*, Wall., P G BLUMEANA DC

Vern.—*Sethanbaya* BURM

References.—*Roxb Fl Ind Ed CBC 238 Kurs For Fl II 40 Pharm Ind 118 O Shaughnessy Beng Dispens, 400*

Habitat.—A shrub from 15 to 20 feet in height met with at the foot of the Sikkim Himalaya also in Assam, Sylhet, Chittagong, Behar (at the summit of Pareshnāth) and Pegu.

Medicine.—Roxburgh states that the FRUIT is used medicinally by the Natives of Chittagong, who consider it anthelmintic and cathartic.

Domestic Uses.—The FRUIT is said to be employed in removing stains from silk (*Roxburgh*).

G coronaria, Ham, Fl Br Ind, III, 117

THE GARLAND GARDENIA

Syn.—*GARDENIA COSTATA* Roxb ? *G. CARINATA*, Griff

Vern.—*Yeng khat tsaythambyah* BURM

References.—*Roxb Fl Ind Ed CBC 237 Kurs For Fl Burm II 43 Gamble Man Timb 229 Mason Burma and its People 414 785 P W D Report on Gums 3*

Habitat.—A tree met with commonly in mixed moist forests all over Burma, from Chittagong, Pegu and Martaban down to Tenasserim. It bears handsome large flowers which are white when they expand at day break but change to a deep yellow towards evening.

Oil.—This species is said to yield a wax which however does not appear to have been examined and described nor is there any record of its utilisation by the Natives.

Structure of the Wood.—Pale brown or white of an unequal fibre, rather brittle and very close-grained. Weight 51 lb per cubic foot. It is employed for making combs, and for turning, but has the disadvantage of being very liable to crack.

DYE

MEDICINE

Fruit

102

FOOD

Fruit.

103

TIMBER

104

105

MEDICINE

Fruit

106

DOMESTIC

Fruit.

107

108

OIL

109

TIMBER.

110

G 110

GARDENIA
gummifera.The Cape Jasmine, *Dikamali* Resin.

III

Gardenia florida, Linn, DC, Prodr, IV, 379

THE CAPE JASMINE

A handsome shrub, which though a native of China, is now extensively cultivated for ornamental purposes in India. In Hindustáni, it is known as *Gundha raj*, and in Burmese as *Thong sin pan*.

Medicine.—The Japanese are reported to employ its BARK (*routinachi*) and the PULP of its FRUIT as a yellow dye. Dymock states that in the Konkan the ROOT is rubbed into a paste with water and applied to the top of the head as a remedy for headache during pregnancy and that it is also given internally in hysteria alone or combined with *bhārangi* (*Clerodendron Siphonanthus* Br.)

MEDICINE

Bark

II2

Pulp

II3

Fruit

II4

Root

II5

II6

G gummifera, Linn f Fl Br Ind III 116**Syn**—*GARDENIA ARBOREA* Roxb *G INERMIS*, Distr

Vern—The gum resin=*dikamali dikamli* HIND *Baruri baris* KOL *Bruru BHUMI* *Papra kamarru karmarru* the gum resin=*dekamali* C P the gum resin=*dikamali* BOMB *Kamarri dikamali* GUZ; the gum resin=*Kumbai dikamali* TAM *Chittamatta garaga chir-bikk* the gum resin=*tella manga chinaka ringuva* TEL *Bikka gida* the gum resin=*dukke mali* KAN the gum resin=*Kola lakada* SING the gum-resin=*Kunkham* ARAB

References.—Roxb *Fl Ind.*, Ed C B C 238 W & A *Prodr*, 395 *Gamble, Man Tumb* 229 *Dals & Gibs*, Bomb *Fl* 120 (Excl Syn) *Elliot Fl Andhr* 41 44, 58 *Pharm Ind* 118 *Ainslie Mat Ind* 11 89 *Moodeen Sheriff Supp Pharm Ind* 146 *Dymock Mat Med W Ind* 2nd Ed 411 *Murray Pl and Drugs Sind* 195, *Year book of Pharmacy* 1878 73 *Drury U Pl* 224 *Lisboa U Pl Bomb*, 86, 162 *Birdwood Bomb Pr* 44 269 *Cooke Gums and Gum-resins* 66 P W D *Report on Gums* 14, 27 33 35 *Balfour Cyclop J* 1177 *Smith Dic* 154; *For Adm Report Ch Nagpore* 1885, 6 33 *Journal Agri Hort Soc Ind (Old Series)* X 10 *Indian Forester* III 203; X 222 *Settlement Reports—Central Provs Chanda Dist App VI* *Chhind wara Dist* 110 *Gazetteers—Mysore & Coorg* I 50 *Bombay XV pt I* 436

Habitat—A large shrub met with in Central and South India from the Satpura Range southwards

GUM-RESIN

II7

Gum Resin—The remarkable gum resin *dikamali* or *cumbi-gum* is obtained from this species and from *G lucida*, Roxb. The exudation from both species is apparently identical, and in both cases forms transparent tears from the extremities of the young shoots and buds. These shoots and buds are broken off with the drops of gum resin attached and exposed for sale either in this form or after agglutination into cakes or irregular masses

Characters

II8

CHARACTERS AND CHEMICAL COMPOSITION—Commercial *Dikamali* occurs either in the form of the twigs coated with and agglutinated by the gum resin, or as irregular earthy looking masses of a dull olive-green colour which consist of the resin more or less mixed with bark sticks and other impurities (*Cooke*). It has a peculiar and offensive odour like that of cat's urine. When carefully collected and free from impurity it is transparent and of a bright yellow colour. The gum resin has been examined by Flückiger, Dymock and later by I. Stenhouse and O. E. Groves, and has been found by the last two investigators to contain two distinct resins. One of these an amorphous greenish yellow substance is by far the largest constituent, the other occurs only in small proportion, and is obtained in slender pale yellow crystalline needles. To the latter the name of *Gardenin* has been applied. In the investigation referred to *gardenin* was separated by boiling the *Dikamali* with alcohol, filtering the solution and allowing the filtrate to cool. The needles thus obtained were washed with cold spirit to free them from the green amorphous resin, and then treated

The *Dikamali* Resin.

(*J Murray*) **GARDENIA**
gummifera.

with light petroleum to remove a fatty impurity which remained. They were finally purified by alternate crystallisation from hot benzene in which they are readily soluble, and from alcohol. From the pure *gardenin* thus obtained a very interesting brilliant crimson crystalline substance was derived by treatment with boiling glacial acetic acid to which the name of *gardenic acid* was provisionally applied.

Medicine.—Though *Dikamali* RESIN is produced in great abundance in Western India it appears to have been little known to ancient Hindu medicine and is not even mentioned in any of the Sanskrit works on *Materia Medica* (*Dymock*). It seems however to have been known to western civilisation for many centuries *Birdwood* referring the *καρυ* *καρυ* of *Dioscorides* and *Sprengel* the *concamum* of *Pliny* to this drug. In no modern European work however does there appear to be any reference to *Dikamali*, a fact which is the more remarkable when its peculiar and characteristic appearance and odour are considered. *Ainslie* appears to have been the first to describe its utilisation in India. In his *Materia Indica* the following passage occurs: *Cumbispisin* or *cumbi* gum is a strong smelling gum resin not unlike myrrh in appearance and possessing the *Hakims* say nearly similar virtues it is however far more active and ought on that account to be administered in very small doses as an external application it is employed dissolved in spirits for cleaning foul ulcers and where the balsam of Peru cannot be obtained might be used as a substitute for arresting the progress of sphacelous and phagedenic affections which that medicine has the power of doing (at least in hot climates) in a very wonderful manner. The drug is considered anti spasmodic carminative and when applied externally antiseptic and stimulating. It is accordingly employed by the Natives of Southern and Western India in cases of hysteria, flatulent dyspepsia and nervous disorders due to dentition in children also externally as an application to foul and callous ulcers and extensively to keep away flies from sores. It has also been employed in European practice for the last purpose with marked success both in hospitals and in veterinary work and is said to be a successful anthelmintic in cases of round worm. Little is known however regarding its exact therapeutic properties as an internal medicine and it is possible that its virtues may be overestimated by the Natives.

SPECIAL OPINIONS—§ The powdered gum resin is said to have diaphoretic and expectorant properties used internally in guinea worm dose from 2 to 16 grains. It is often rubbed on the gums of teething children (*Deputy Sanitary Commissioner Joseph Parker M D Poona*). Useful to destroy maggots in old wounds (*Surgeon Major and Civil Surgeon G Y Hunter, Karachi*). Used by native farriers. Has a strong aroma and is used in South India in hospitals to keep away flies from sores (*Surgeon H W Hill Madras*). A lotion made from *Dikamali* is used to keep maggots from sores. Every morning is given in dyspepsia (*Surgeon James McCloghry, Poona*). An infusion is said to be useful in treatment of worms in children (*Surgeon J C H Peacocke I M D Nasik*). The gum of the tree melted in oil is applied to the forehead to check headache. (V *Ummegudsen Mettapolliam Madras*).

Food—The FRUIT is said to be eaten (*Lisboa*).

Structure of the Wood—Yellowish-white, hard, close-grained, might serve as a substitute for box wood.

Agricultural Use.—A solution of the gum-resin has been recommended by *Watson* as a sheep-wash.

Trade.—*Dikamali* obtained from Southern India, or imported from Arabia, is sold in Bombay at Rs 12 per maund of 37½ lb (*Dymock*).

GUM-RESIN

MEDICINE

Resin

119

FOOD
Fruit.

120

TIMBER

121

AGRICULT
USE

122

TRADE.

123

GARDENIA
lucida**The Dikamali Resin.****124****Gardenia latifolia**, Aiton ; *Fl Br Ind*, III, 116 ; *Wight, Ic*, t 759

Vern.—*Papra pāpār pepero banpindlu* HIND *Papra papasar papar* KOL *Popra SANTAL Kota ranga, URIYA Gogar BHIL, Pempri MAL (S P) Pannabhil gungat bhandra geggar GOND Papra papadar popra KHARWAR Gogar C P Gandru papura kariga phiphar ghogar gogarli BOMB Ghogar gogarli MAR Kumbay I AM Pedda karinga pureea bikki gaiger karukiti karinguva konda manga TEL*

References—*Roxb Fl Ind Ed C B C* 237 *Brandis For Fl* 271 *Gamble Man Timb* 229 *Dals & Gibs Bomb Fl*, 120 *Fliot Fl Andhr* 27 77 83 92 96, 104 *Rev A Campbell Fc Prod Chutia Nag pur No* 9229 *Lisboa U Pl Bomb* 86 *For Ad Report Chutia Nag pur* 1885 32 *Indian Forester* III 203 IV 343 345 *Gazetteers N W P I* 81

Habitat—A small deciduous tree met with in the dry hilly districts of Western Central and South Western India also in the North Western Himalaya in Garhwā only where it ascends to 3 000 feet, and in Behar and Western Bengal

Food—The FRUIT is eaten by the Santals' (*Rev A Campbell*)

Structure of the Wood—White with a yellowish tinge close and fine grained weight 52 to 53 lb per cubic foot It is easy to work and durable and has been recommended as a substitute for box wood and as likely to be useful for the purposes of the engraver and wood turner It is employed by the Natives to make combs

Domestic, &c—The plant is recommended by Roxburgh as worthy of attention for ornamental purposes He writes Its large glossy green leaves independent of the size beauty, and fragrance of the flowers render it highly ornamental

FOOD

Fruit

125

TIMBER

126

DOMESTIC

127**128****G lucida**, *Roxb Fl Br Ind*, III, 115 *Wight Ic*, t 575

Syn—*G RESINIFERA Roth*

Vern—*Dikamali* HIND *Konda manga kokkita tetta manga kuru C P Dikamali MAR Dikamali Guz Papar BIJERAGOGARH Kumbay I AM karinga karangri karung tella manga china karinguva TEL*

[The vernacular names for the gum resin are the same as those applied to the exudation of *G gummifera*, Linn (which see)]

References—*Roxb Fl Ind Ed C B C* 237 *W & A Prodr* 395 *Brandis For Fl* 271 *Kurs For Fl Burm* II 42 *Beddome Fl Sylv Anal Gen XV* f 6 *Dals & Gibs Bomb Fl* 120 *Elliot Fl Andhr* 39 177 *Pharm Ind* 188 *Ainslie Mat Ind II*, 89 *Moodeen Sheriff Supp Pharm Ind* 146 *Dymock Mat Med W Ind 2nd Ed* 411 *S Arjun Bomb Drugs* 71 *Murray Pl and Drugs Sind*, 195 *Year book of Pharmacy* 1878 73, *Drury U Pl* 224 *Lisboa U Pl Bomb* 86 251 *Birdwood Bomb Pr* 269 *Cooke Gums and Gum-resins* 66 *Watson Report on Gums* 3 14 27 33 35 *Balfour Cyclop I* 1177 *Smith Dic* 154 *Kew Off Guide to the Mus of Ec Bot* 79 *Indian Forester* III 203 VIII 417 *Settlement Reports*—*Central Provs Upper Godavery Dist*, 38 *Raepore Dist* 76 77 *Gazetteers*—*Bombay, XV pt I* 70 436, *Central Provs* 504

Habitat—A small deciduous tree found in Central and South India (common from the Konkan southwards) also in Chittagong and Burma

Gum resin—This species along with *G gummifera*, Linn yields the *Dikamali* or Cambi resin for a description of which the reader is referred to the article on the latter species

Medicine—See description of the properties of *Dikamali* gum-resin in the article on *G gummifera*, Linn

Food—The FRUIT is said to be an article of food in the Central Provinces

Structure of the Wood—Yellowish white close-grained hard containing no heart wood weight 39 lb per cubic foot It is useful for turning and is employed for making combs by the Natives.

GUM-RESIN

129

MEDICINE

130

FOOD

Fruit

131

TIMBER

132**G 132**

Resin-Yielding Trees	(7 Murray)	GARUGA pinnata.
Gardenia obtusifolia, Roxb <i>Fl Br Ind, III, 116</i> Syn —G SUAVIS Wall Cat 8274 RUBIACEA Wall Cat 8294b Vern —Veng khat yingat yinkat BURM References —Kurs For Fl Burm II 42; Gamble Man Timb 229 Habitat —A small deciduous tree frequent in the In or Dipterocarpus dry forests from Prome and Martaban down to Upper Tenasserim Resin —This is said by Kurz and others to yield a fine pellucid yellow resin which is probably nearly allied in its characters to that derived from <i>G gummifera</i> and <i>G lucida</i> . No information exists however regarding its physical and chemical characters nor is it known to be of any economic value Structure of the Wood —White moderately hard weight 59lb per cubic foot		133
G turgida, Roxb <i>Fl Br Ind III 118 Wight Ic, t 579</i> Syn —GARDENIA CUNEATA Br G DONIA Ham Var —MONTANA Roxb (Sp); leaves orbicular and densely tomentose beneath G MONTANA DC Vern —Thanella khurrur khurari ghurga mhaner HIND Bamemia dhobelkirat URIYA Karhar duduri KOL Phurpata KURKU Dandu kit doudouki SANTAL, Kharkar MAL (S P), Panyra pendra GOND Thanella N W P Karumba MERWARA; Karumba RAJ Karhar khemra C P Khurphendra pendri phanda phetra MAR Phetrak BHIL; Manyunda teldi (var montana=Tella kakhisa) TEL Bongers KAN Thaminsani BURM References —Roxb Fl Ind Ed C B C 239 Kurs For Fl Burm II 41 Beddome Fl Sylv Anal Gen t 15 f 6 Gamble Man Timb 228 Rev A Campbell Ec Prod Chutia Nagpur No 8495 Duthie Rep on a Botanical Tour in Merwara 15 Atkinson Him Dist 311 For Ad Report Chutia Nagpur 1885 32 Indian Forester —IV 322 VIII 416 417, IX 59 X 325 XII 419 XIII 121 XIV 112 Gasetteer N W P IV lxxiii Habitat —A small deciduous tree met with in the sub-Himalayan tract from Nepál to the Jumna ascending to 4 000 feet also in Rajputana Burma and Central and South India Gum —This species is said to yield a hard yellow gum (E A Fraser Rajputana) Medicine —The Rev A Campbell states that a preparation from the root is employed by the Santals as a remedy for indigestion in children Structure of the Wood —White with a purplish tinge no heartwood close-grained and hard weight from 54 to 58lb per cubic foot It is good and durable but liable to crack and split in seasoning Domestic and Sacred —The ROOT is regarded as a charm by the Natives of Chutia Nagpur who wear it attached to the wrist by a cord		RESIN 134 TIMBER 135 136
Garlic , see <i>Allium sativum</i> , Linn Vol I, 172 Garlic Tree , see <i>Cratæva religiosa</i> , Forst var <i>Roxburghii</i> , Vol II, 585 Garnets , see <i>Precious Stones</i> GARNOTIA , Brongn; Gen Pl, III, 1118 Garnotia stricta , Brongn GRAMINEÆ, Thwaites, En Pl Zeyl, 63 A grass met with in the more elevated parts of Central Ceylon; said by Thwaites to be much used for thatching GARUGA , Roxb, Gen Pl, I, 323 Garuga pinnata, Roxb <i>Fl Br Ind, I 528</i> , BURSERACEÆ Syn —? GARUGA MADAGASCARIENSIS DC		GUM 137 MEDICINE Root 138 TIMBER 139 DOMESTIC 140 SACRED Root 141

GARUGA
pinnata.**The Garuga Gum.**

Vern—*Ghogar karkar tum* HIND *Jám túm kharpat nshhads* BENG.
Mohi URIYA Nja jowa KOL *Karár BHUMIJ Kekkeda*, KURKU;
Kikur KHARWAR Ge idels poma, ASSAM *Chitopoma* GARO; *Dabdadbi*
 NEPAL *Maldst Lefcha*; *Gia MICHÍ*; *Kosramba*, MAL (S P) *Gúpní*
kekra, *gharri* GOND; *Karolu*, *ghogar karkar* OUDH *Kharpat gurja*
 gum=*katila* N W P *Kilmira kilmira kharpat*, *katula sarota*, KU
 MAON *Khorpat katula kilmira sarota* PB; *Kurak kanghur* DEC
Gurja BANDA *Kankar karkra ghunja maharut* C P *Kekda* MEL
 GHAT *Kákad kurak kanghur* BOMB *Kuruk kudak* MAR; *Karapti*
 KATHIAWAR *Kusimb* GUZ, *Karre vembu karvambu* TAM *Garugo*
kalugudu garugu garga TEL *Hala*, *balage* KAN *Katu kalesjam*
 MALAY *Mroung shisha* MAGH *Chinyok chinyp* hsen-yout BURM

References—*Roxb Fl Ind Ed C B C* 370 *W & A Prodr* 175
Brandis For Fl 62 *Kurz For Fl Burm* I 207 *Beddome Fl*
Sylv t 118, *Gamble Man Timb* 66 *Grah Cat Bomb Fl* 43
Stewart Pb Pl 45 *Rheede Hort Mal* IV t 33 *Elliot Fl Andhr*
 58 78 *Mason Burma and Its People* 761 *Dymock Mat Med W Ind*
 2nd Ed 167 *Baden Powell Pb Pr* 581 *Atkinson Him Dist* 367
 779 *Lisboa U Pl Bomb* 38 140 241 278 *Birdwood Bomb Pr*
 147 *Cooke Gums and Gum-resins* 18 *Atkinson Gums and Gum*
resins 14 *Liottard Dyes*, 33 *Atkinson Ec Prod N W P pt I* 17
part V 53 *Balfour Cyclop* I 1182 *Indian Forester* I 83 III 201
 IV 322 VIII 414 X 325 XII 311 XIII 120 *Gazetteers*—
Bombay VIII 11 & III pt I 24 XV pt I 70 429 *N W P I*
 80 IV lxix *Burma I* 137 *Aplin Rep on Shan States* 1887-88

Habitat—A tree attaining the height of from 30 to 40 feet met with in the Sub-Himalayan forest from the Jumna eastwards where it ascends to 3 000 feet also in Central and Southern India Chittagong and Burma It flowers from February to March and the fruit ripens in June and July

Gum Resin—This tree yields a greenish yellow translucent exudation in small mamilliform masses, having a mild terebinthinate odour and taste It has been generally regarded by Indian writers as a true gum Watson and Oooke amongst others classifying it with Gum acacia, &c Dymock however states that it contains small proportions of an oleo-resin and is in reality a gum resin He writes "Only a small part of it is soluble in rectified spirits causing a slight turbidity in water it rapidly disintegrates forming a tolerably thick mucilage in which globules of oleo resin may be seen with the microscope The insoluble portion is amorphous flaky, and white, after its removal the mucilage is precipitated milk white by rectified spirit" No record exists in economic literature of this exudation being utilised in the arts but in Bombay it is employed as a medicine Mr O Conor mentions *Garuga* in his list of trees on which lac is produced

Dyes and Tans—The BARK is used for tanning in many parts of the country and is said by Kurz to be good for that purpose The same writer mentions that in Burma the LEAVES are frequently invested with large red obovate apiculate galls

Medicine—Dymock writes "In Salsette near Bombay the JUICE OF THE STEM is dropped into the eye to cure opacities of the conjunctiva (? cornea) "The FRUIT, which is greenish yellow and about the size of a gooseberry is pickled and eaten as a cooling and stomachic remedy it is strongly acid In the Konkan the JUICE OF THE LEAVES with that of the leaves of *Adhatoda Vasica* and *Vitex trifolia*, mixed with honey, is given in asthma.

Food and Fodder—The fleshy smooth black acid DRUPE is eaten raw, pickled or cooked by the natives As above stated it is considered a semi medicinal article of diet The SHOOTS and LEAVES are collected for fodder, especially for elephants

Structure of the Wood—Greyish or yellowish heartwood dark reddish-brown, rather heavy (about 40lb per cubic foot), coarsely fibrous, but

GUM-RESIN
144

DYE & TAN
Bark

145

Leaves

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MEDICINE

Juice

147

Stem

148

Fruit

149

Leaves

150

FOOD

Drupe

151

FODDER

Shoots.

152

Leaves

153

TIMBER

154

The Gelonium	(F Murray)	GENIOSPORUM prostratum.
fairly close-grained takes an indifferent polish, seasons well, but is not durable and is very liable to the attacks of insects. It is accordingly not much used for construction, but is employed for indoor work such as beams rafters, &c, and has been recommended for cabinet work. It is also extensively used as fuel.		TIMBER
Domestic Uses —It is stated in the <i>Thana Gazetteer</i> that the soft elastic bark is much employed for flooring cattle-sheds.		DOMESTIC 155
Geese, see Ducks, p 196		
Gelatine, see Isinglass, Vol IV		
Gelidium cartilagineum, Gaill and		
G corneum, Lam ALGÆ, see Isinglass, Vol IV		
GELONIUM , Roxb Gen Pl III, 324		
Gelonium lanceolatum , Willd Fl Br Ind V 459; Wight Ic, [1867; EUPHORBIACEÆ		156
Syn —GELONIUM BIFARIUM Wight (not of Roxb)		
Vern —Kakra URIYA Kāru guggilam surapada TEL		
References —Roxb Fl Ind Ed C B C 738 Beddome For Man 214 (excl syn) Gamble Man Timb xxix Thwaites En Ceylon Pl 274 (excl syn) Balfour Cyclop I 1189		
Habitat —A small evergreen tree found in the Deccan and Ceylon, ascending in the latter locality to 4 000 feet		
Structure of the Wood —Yellow smooth close and even grained with a peculiar waxy odour weight 50lb per cubic foot. It is well adapted for house building purposes		TIMBER 157
G multiflorum , A Juss Fl Br Ind, V 459		158
Syn —GELONIUM FASCICULATUM Roxb; SUREGADA GLABRA Roxb mss S BILOCULARIS Wall ROTTLERA FASCICULATA and CONGESTA Ham		
Vern —Ban naringa HIND Sarugdla TEL Setahanbaya BURM		
References —Roxb Fl Ind Ed C B C 738 Kurs For Fl Burm II 409 Elliot Fl Andhr 171 Gazetteer Mysore and Coorg I 65		
Habitat —A glabrous tree from 30 to 40 feet in height met with from Bengal and the Circars northwards to the foot of the Sikkim Himalaya also in Chittagong Upper and Lower Burma and Malacca		
Resin —Roxburgh and Kurz mention that the BUDS of this species exude yellow resin. There is no record however, of this having been collected or utilised in any way		RESIN Buds 159
Structure of the Wood —White only fit for house-posts and similar purposes" (Kurs)		TIMBER 160
GENIOSPORUM , Wall, Gen Pl, II, 1172		
Geniosporum prostratum , Benth; Fl Br Ind, IV, 610		
[LABIATÆ		161
Syn —OCIMUM MENTHOIDES Burm O PROSTRATUM Linn O MACROSTACHYUM Poir MENTHA OCIMOIDES Lamk THYMUS INDICUS Burm		
Var —GRACILIS, Thwaites (sp) G GRACILE, Benth		
Vern —Nasel nagat TAM		
References —Thwaites En Ceylon Pl 237, Grah Cat Bomb Pl 148		
Habitat —A herb of the Deccan from the Konkan southwards and of Ceylon		
Medicine —In Pondicherry this plant is supposed to have febrifugal properties		MEDICINE 162

GENTIANA
lutea

The Indian Gentian

GENTIANA, Linn, Gen Pl, II, 815

A genus of annual or perennial herbs comprising about 180 species chiefly natives of the mountains of the Old World. Of these 37 are met with in India. All the members of the genus are to a greater or less extent characterized by the bitterness of their stems and roots and many are of considerable medicinal value.

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Gentiana decumbens, Linn f, Fl Br Ind, IV, 117, GENTIANACEÆ

Syn — *G. ASCENDENS* Pall. *PNEUMONANTHE ASCENDENS*, Schmidt
DASYSTEPHANA ASCENDENS Borkh

References — Stewart Pb Pl 147

Habitat — Baltistán and Western Tibet at altitudes of from 11 000 to 15 000 feet, eastwards to Lahoul, common on the Karakorum. Distributed to Dauria and Siberia.

MEDICINE

Medicine — A tincture prepared from this plant has been used as a stomachic by the Lahoul missionaries (Stewart)

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[68, f 2 and p 278]

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G. Kurroo, Royle Fl Br Ind IV 117, Royle, Ill Him Bot t

Syn — *PNEUMONANTHE KURROO* D Don

Vern — *Karú kutki* HIND *Karu kutki* BENG *Nikant kamalphul nilakil* root=*karu* PB *Pháshánveda pakunbed* BOMB *Pakhan bhed* GUZ According to Dymock *pakunbed* though applied by Muhammadan writers to this plant is the name associated in Bombay with what appears to be the root of an Iris.

References — Stewart Pb Pl 147 Clarke in Jour Linn Soc XIV 440 Pharm Ind 149 O'Shaughnessy Beng Dispens 450 Atkinson Him Dist 313 737 Kew Off Guide to the Mus of Ec Bot 98 Gasetteer Panjab Simla Dist 12

Habitat — A small herb with a handsome blue flower common in Kashmir and the North West Himalaya altitude 5 000 to 11 000 feet.

MEDICINE

Root

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Medicine — The root is used medicinally as a bitter tonic and as a substitute for the true Gentian. On the hills it is viewed as a febrifuge and is largely exported to the plains along with *Picrorhiza Kurroo*, Royle, as the official *karu* or *kutki* of which Stewart says 36 maunds were in 1867 brought from Kullu and exposed for sale at Rampur. Davies Trade Report gives 20 maunds as annually exported from Pesháwar to Kabul and Atkinson says that five tons are annually exported from the hills to the plains. It appears probable that the root of this species is very similar to that of *G. lutea*, which forms the true Gentian of commerce the chemical composition and medicinal properties of which will be described below.

SPECIAL OPINIONS — § Used principally as a *masálah* for fattening horses (Surgeon Major C W Calthrop M D Morar). Acts as an aperient in larger doses (Civil Surgeon R Gray Lahore). Said to diminish the fever of phthisis (Surgeon F C H Peacocke I M D Nasik). Used for urinary affections (Surgeon Major S M Robb Civil Surgeon Ahmedabad).

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G. lutea, Linn DC, Prodr., IX, 86

COMMON EUROPEAN YELLOW GENTIAN

Vern — *Pakhán-bid* * HIND *Juntiyánah* DEC *Jintiyánd* BOMB *Jm tiyánd* ARAB *Kon shad* PERS

References — O'Shaughnessy Beng Dispens 57 Moodeen Sheriff Supp Pharm Ind 146; Dymock Mat Med W Ind 2nd Ed 543 Flüch & Harb Pharmacog 434, U S Dispens 15th Ed 707, Bent & Trim Med Pl 182 S Arjun Bomb Drugs 90 Year Book Pharm, 1874 627 Irvine Mat Med Patna 33 Kew Off Guide to the Mus of Ec Bot 98

* See the remarks on this vernacular name under **G. Kurroo**

The European Gentian

(J Murray)

**GENTIANA
tenella.**

Habitat—A handsome perennial herb native of the alpine and sub-alpine regions of South Europe. The dried root of the plant is imported into India.

Medicine—The name of the genus is said to be derived from *Gentius* a King of Illyria who reigned from 180 to 167 B C, and by whom according to *Pliny* and *Dioscorides* this species was noticed. It has therefore been known as a medicine from very remote times and many of the complex preparations handed down by the Greeks and Arabians, mention it amongst their ingredients. The Arabian and Persian names show that the knowledge of the plant in this country must have been derived from the Greeks. As above stated the root is to this day imported to a considerable extent. The drug is an important one in all the Pharmacopœias of Europe and America and enters into most of the stomachic and tonic prescriptions of modern practice. In India also it is extensively employed both by European and Native physicians but it appears probable that a more careful and exhaustive examination of indigenous species may lead to the substitution of one or more of them for the imported article. As already stated *G. Kurroo* appears to be the best known and most widely employed of these native species and would perhaps on examination, be found to afford the best substitute.

CHEMICAL COMPOSITION—According to the learned authors of the *Pharmacographia* the bitter taste of Gentian root is due to a principle *Gentiospirin*, $C_{20}H_{30}O_{12}$ which under the influence of a dilute mineral acid is resolved into glucose and an amorphous yellowish brown neutral substance called *Gentioenin*. Another constituent is *Gentianin*, $C_{14}H_{10}O_8$ a tasteless substance occurring in yellowish prisms. Besides these the root contains pectin to a large extent and 12 to 15 per cent. of an uncrystallizable sugar of which advantage is taken in Bavaria and Switzerland for the manufacture by fermentation and distillation of a potable spirit. The root contains no tannic acid.

ACTION AND USES—Gentian possesses in a high degree the tonic properties which characterise the simple bitters of which it is perhaps the most popular and extensively used. It possesses the advantages of being agreeable and slightly aromatic of being only very slightly astringent owing to the absence of tannin from its composition and of being a slight laxative and disinfectant. It accordingly excites the appetite invigorates digestion, slightly increases body heat by stimulating the circulation and acts beneficially on the bowels. In very large doses however it is apt to cause too great gastro intestinal irritation resulting in nausea and even vomiting and diarrhœa. It is specially indicated in cases of debility in convalescence after exhausting diseases and in gouty dyspepsia. It was formerly also held in high repute in India as a bitter tonic in intermittent fevers. The *United States Dispensatory* contains the information that its powder has been employed as an application to malignant and sloughing sores. The *Pharmacopœia of India* describes four preparations of the root—a Compound Infusion a Mixture an Aqueous Extract and a Compound Tincture.

Trade—Dymock states that European Gentian root is obtainable in Bombay for about 4 annas per lb while Irvine in his *Materia Medica of Patna* writes Real Gentian root imported from Turkey price per lb Rs 8.

Gentiana tenella, Fries Fl Br Ind, IV, 109

Syn—*GENTIANA PEDUNCULATA*, Royle *EURYTHALIA PEDUNCULATA*
NANA AND GRACILIS Don

Vern—*Tita Pb*

MEDICINE
Root
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CHEMISTRY
169

USES
170

TRADE
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**GERANIUM
nepalense****The Geraniums, or Crane-bills****MEDICINE
Leaves**

173

Stems

174

175

**MEDICINE
Plant**

176

177

**DYE.
Root**
178**MEDICINE
Plant.**
179**References**—*Stewart Pb Pl 148 Atkinson Him Dist 313***Habitat**—Common in Kashmir and the Western Himalaya, at altitudes from 10 000 to 14 000 feet Distributed through Arctic and Alpine Europe and Northern and Central Asia —**Medicine**—*Stewart* states on the authority of *Atkinson* that in Lahoul a decoction of the LEAVES and STEMS of this and other species is given in fevers**GEOPHILA, Don , Gen Pl, II, 127**

[54 RUBIACEÆ

Geophila reniformis, Don Fl Br Ind, III 178 Wight, Ic t**Syn**—*GEOPHILA DIVERSIFOLIA DC PSYCHOTRIA HERBACEA Linn CEPHAELIS HERBACEA Kurz***Vern**—*Kudi mankuni SYLHET Karinta kali MALAY***References**—*Roxb Fl Ind Ed C B C 179 W & A Prodr 436 Kurz For Fl Burm II 5 In Four As Soc Ben 1877 II 140 Thwaites Fn Ceylon Pl. 150 Dals & Gibs Bomb Fl 111 Rheede Hort Mal X t 21***Habitat**—A small herb met with in Sylhet the Khásia Hills the Western Gháts from the Konkán southwards Tenasserim and the Andaman Islands It is also common in the central parts of Ceylon Distributed through the Malay Archipelago Southern China Polynesia Tropical Africa and America**Medicine**—*Kurz* writes that this PLANT possesses qualities similar though inferior to those of *Cephaelis Ipecacuanha***GERANIUM, Linn Gen Pl I, 272**

A genus of herbs or undershrubs belonging to the Natural Order GERANIACEÆ and comprising about 100 species of which from 18 to 20 are natives of India Many species are extensively cultivated as flowering plants The generic name is derived from the Greek γέρανος (a crane) owing to the supposed resemblance of the fruit to the head of that bird Certain species appear to have been known from remote times to possess medicinal virtues Thus Dioscorides mentions a plant called γέρασιον as employed for its astringent properties Pliny alludes to two species

Geranium nepalense, Sweet Fl Br Ind I, 430 Wight Ill I, [153, t 59 GERANIACEÆ.**Syn**—*GERANIUM RADICANS DC G PALLIDUM and G PATENS Royle G AFFINE W & A G ARNOTTIANUM Steud***Vern**—*Bhándá HIND Bhándá (root in bazars=rowíl bhand) Pb***References**—*W & A Prod 133 Stewart Pb Pl 36, Botany of Tour in Hasdra in Agri Hort Soc of Ind Jour (Old Series) XIV 16 Pharmacog Indica I 248 Baden Powell Pb Pr 334 Atkinson Him Dist 307***Habitat**—A herbaceous prostrate plant common throughout the temperate Himalaya at altitudes of from 5 000 to 9 000 feet found also in the Khásia Hills, the mountains of Southern India, and Ceylon Distributed to Yunnan**Dye**—The ROOT, which greatly resembles that of *Onosma echioides*, affords an abundance of red colouring matter, which is said by Dymock to be employed in colouring medicinal oils *Stewart* states that it forms an article of trade being brought from the hills to the plains of the Panjáb and sold as a dye**Medicine**—The PLANT possesses the astringent properties of the genus, and is employed, at least in the Panjáb, as an astringent, and in certain renal diseases**G. 179**

The Geraniums, or Crane-bills (F Murray)

GERANIUM
Wallichianum

Geranium ocellatum, Camb, Fl Br Ind, I, 433, Royle, Ill
[149, 150]

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Syn — GERANIUM BICOLOR and G CHOORENSE, Royle

Vern — Bhānd bhanda HIND and Pā

References — Stewart Jour of a Tour in Hasdra in four Agri Hort Soc of Ind (Old Series) XIV 11 14 Pharmacog Indica I 248; Atkinson Him Dist 307 738

Habitat — A small straggling herb met with on the temperate and sub-tropical Himālaya from the Panjāb to Nepāl and on the summit of the Parasnath in Chutia Nagpur

Medicine — The PLANT possesses astringent and diuretic properties, and is employed medicinally in the Panjāb and North West Provinces

MEDICINE
Plant
181
182

G Robertianum, Linn Fl Br Ind, I, 432 Royle, Ill, 151, t 27

Syn — G LINDLEYANUM Royle

References — Pharmacog Indica I 218 U S Dispens 15th Ed 1652 Atkinson Him Dist 307

Habitat — A fetid rather succulent annual or biennial herb found in the western temperate Himālaya from Kashmir to Garhwāl at altitudes of 6 000 to 8 000 feet, distributed to Siberia Asia Minor the Caucasus and Europe

Medicine — This herb though now almost entirely neglected was formerly much used in European medicine. It has a disagreeable bitterish astringent taste and imparts its virtues to boiling water. It was formerly employed internally in intermittent fever consumption nephritic complaints jaundice &c as a gargle in affections of the throat and externally as a resolvent to swollen breasts and other tumours (U S Dispensatory). It is somewhat remarkable that while all the species of this genus have been for many years rejected from the European Pharmacopœia **G maculatum**, Linn is still extensively employed and highly valued in America. It is a domestic remedy in many parts of the United States and is esteemed as one of the best indigenous astringents contained in their Dispensatory the absence of unpleasant taste and of other offensive qualities rendering it particularly suitable for administration to children. Diarrhœa chronic dysentery cholera infantum, and hæmorrhage are the diseases for which it may be employed with greatest advantage. It appears probable that the nauseous fetid taste and odour of the common European species has led to its rejection and it may be that one or all of the Indian species **G nepalense**, **G ocellatum** and **G Wallichianum** may possess the good properties of the American officinal drug without having the objectionable qualities of **G Robertianum**.

MEDICINE
Plant
183

G Wallichianum, Sweet Fl Br Ind, I, 430 Wight Ic t 324

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Vern — Liljahri N W P Roots — Mam-i ran Afg

References — Atchison Fl Kuram Valley 25 39 Pharmacog Indica I 248 Atkinson Him Dist 307

Habitat — A herb with large bluish flowers native of the temperate Himālaya from Nepāl to Marri at altitudes of 7 000 to 11 000 feet. Atchison also describes it as met with in the Kuram Valley amongst bushes grass and boulders, where there is moisture from 8 000 to 10 000 feet.

Medicine — This herb evidently possesses the astringent properties of the genus to a marked degree. Atchison writes: 'At Alikhel a native brought me the stems of the plant which he said was a rare and valuable medicine' and in another passage: The rhizomes of this plant were brought to me (said to be from some hills 30 miles off) as the *mam-i ran* a good medicine for sore-eyes. This is doubtless a local substitute for the

MEDICINE.
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G. 185

GEUM

Gerbera, Geum

true *mam-i ran* i.e. the roots of *Coptis Teeta* Wall Duthie states that in the villages of Jumnotri it is employed as a cure for toothache

GERBERA, *Gronov Gen Pl II, pt I, 497*

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Gerbera lanuginosa, *Benth Fl Br Ind, III 390 COMPOSITÆ*

Syn—*OREOSERIS LANUGINOSA* DC and Wall Cat 2929 A C CHAP TALIA GOSSYPINA, Royle

Var—*PULSILLA, OREOSERIS PULSILLA* DC O LANUGINOSA Wall, Cat 2929 B

Vern—*Kapast kapasiya* cloth woven from fibre=*karkhi kaffi* KUMAON GAUMI GARHWAL *Sung buchachi* SIMLA HILLS *Patpatula, kho bur busli kaffi purju patola kapast bũyo tsar kafi kufra kharebũti* PB *Sokhta tomentum=kaff* MURREE HILLS

References—*Stewart Pb Pl 218, Royle Ill Him Bot 251 t 59 f 2 Atkinson Him Dist 312 793 Royle Fib Pl 302 Cross Bevan and King Rep on Indian Fibres 68 Kew Off Guide to the Mus of Ec Bot 87 Agri Hort Soc of India Trans III 75 Pro 267 VIII 272 276 Fours (Old Series) VII Sel 48 IX 283 Pro 139 X Pro 135 Gasetteer Panyab Simla District 12*

Habitat—A herbaceous procumbent plant of the Western Himálaya from Murree to Kumáon between the altitudes of 4 000 and 8 000 feet The variety *pulsilla* which is apparently a starved condition of *G lanuginosa*, extends to Nepal

Fibre—The under surface of the LEAF is covered with a cotton like tomentum which is employed by the natives of the Himálaya as tinder and for the manufacture of cloth This tomentum has attracted considerable attention at different times and has been variously recommended as a cloth making fibre as a paper making material and as a substitute for cotton in the manufacture of explosive compounds No practical result however appears to have been produced by these suggestions and the fibre is still employed by the natives only The tomentum is prepared for use as follows—About the middle of the rains when the leaf attains its full size the plant is gathered the point of the leaf is severed and the down stripped off towards the base in an entire layer It is then without further preparation twisted into a thread on the common perpendicular *churka* of the country From the thread thus prepared a cloth is woven from which blankets sacks and bags are made by the hill people This cloth has been described as very highly prized for its strength and durability and superior to that manufactured from hemp It is very frequently employed also for making the characteristic bags in which the hill men carry their *hookahs* The tomentum can only however at best be obtained in very small quantities and is of interest as a curiosity only It can never prove of commercial value

FIBRE
Leaf
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GEUM, *Linn Gen Pl, I, 619*

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A genus of perennial *ROSACEÆ* which derives its name from the Greek *gevo* an agreeable taste on account of the slightly aromatic flavour of the roots of certain of the species Two are natives of India *G elatum*, Wall and *G urbanum*, Linn Neither appears however to be recognised in this country as of value, a somewhat remarkable fact in the case of the latter which is the *Avena*, *Radix Caryophyllata* or *HERB BENNET* of old European herbalists The root of this species has a clove-like odour and owing to its stringent properties, has been employed in cases of dysentery *diarrhoea* &c It was also used to flavour ale in olden times and has been recommended in cases of caries of the teeth &c to impart an agreeable odour to the breath *G urbanum* (Linn, *Fl Br Ind II 342*) is to be found in India, on the Western temperate Himálaya, from Murree to Kumáon, at an altitude of 6,000 to 11 000 feet

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Ghi or Clarified Butter

(J. Murray)

GHI

GHI

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Clarified butter largely prepared from the milk of the cow and buffalo and to a smaller extent from that of the sheep and goat, is universally employed for domestic cooking in India and forms an important article of trade. By far the greatest proportion is prepared from buffalo-milk not only because that animal yields more highly fatty milk but because it is cheaper and more easily reared and fed than the more delicate cow. As a consequence, cattle-breeding for dairy purposes is mainly confined to buffaloes.

Vern — GHI HIND; **Neyi** TAM **Neyi** TEL **Ghrta** ghruttham **SANS**

References — *Ain-i-Akbari* Blochmann's Trans. 63 *Voyage of John Huyghen van Linschoten to the East Indies* I 56 58 60 63 67 *Milburn's Oriental Commerce* Ed 1825 288 *U. C. Dutt Mat. Med. Hind* 14 282 *Baden Powell Pb. Pr.* I 151 *Balfour Cyclop.* I 1198 *Settlement Reports* — Central Provs. *Chindwara District* 112 *Jubbulpur* 87 *Panjab Ghang District* 63 *Gazetteers* — *Bombay III* 74 *Central Provs.* 516, *N. W. P. IV* 250 *Panjab Shahpur* 74 *Gujranwala* 60 *Dera Ghazi Khan* 91 *Amritsar* 48 *Bombay Admn. Rep.* 1871 72 394 *Revenue and Agricultural Dept. Reports* 1881 to 1886

Preparation — For the following account of the methods of preparing ghi in the principal ghi producing districts of India the writer is indebted to a report drawn up by Mr. T. N. Mukharji for the Revenue and Agricultural Department in May 1884.

In Bengal — The process of manufacture generally followed is thus described. Fresh milk is boiled on a slow fire for five or six hours being occasionally stirred with an iron spoon to prevent its boiling over. The fuel used is cowdung cake which gives out a moderate heat. The milk gradually assumes a red brown colour and a thick crust is formed on the surface after which it is taken down and allowed to cool. It is then transferred to a separate earthen vessel and a small quantity of whey introduced which in about 12 hours causes the milk to coagulate and turn into pure curd. This curd is transferred to a large earthen or metallic vessel, and a quantity of water added for the purpose of reducing it to a liquid state to facilitate churning. It is then churned by a churning staff as long as it continues to yield butter which is every now and then taken out of the vessel scraped off the staff and collected in a separate pot containing water to allow it to remain cool. Sometimes water is added twice or thrice to the curd before it is quite freed from butter. The butter thus obtained is heated until the greater part of the moisture in it evaporates. The oil like ghi then rises on the surface and the half burnt refuse falls as a sediment. Too much boiling gives the ghi an acrid taste while on the other hand imperfect heating renders it liable to putrefaction. People who manufacture ghi for sale do not however heat it to the full extent for fear that it might lose in weight. Hence the ordinary ghi sold in the bazar is generally not of the best sort. Butter loses about 25 per cent in weight in the process of being made into ghi.

The vessel (generally earthen) in which milk is boiled is always kept very clean, and is warmed on a fire before being filled with fresh milk especially in the cold weather. In the cold season whey is introduced into the milk before it is quite cool since without this addition it does not curdle properly while in the hot weather the application of acid in the warm state decomposes the milk. One ounce of whey is considered sufficient to coagulate about two gallons of boiled milk. Failing a supply of whey other acids are used such as dried mangoe tamarind lime-juice and even a piece of tarnished silver (a rupee), but none of these are so effective as whey. No

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TION
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Bengal
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GHI	Ghi or Clarified Butter
PREPARA- TION Bengal	<p>measure can be given for the quantity of water to be added to the curd before churning as it depends upon the consistency of the latter, generally, however one quart of water is considered sufficient for three quarts of curd. The water ought to be gradually added during the process of churning. In the cold weather hot water is first added until the butter begins to form after which cold water is dashed in to expedite the process.</p> <p>It is not absolutely necessary that the fuel should consist of cowdung. Nor is it necessary that the milk should be heated for five or six hours; indeed the acid whey or curd is in some places put into raw cold milk. By this process however a longer time is necessary to curdle the milk. It is stated that the longer the curdled milk is kept unchurned the larger is the yield of butter and that the maximum time for which curdled milk can be kept without deterioration is three days. The proper time for churning is the cool morning hours as after sunrise the butter does not form into good large lumps and owing to the heat is liable to get thin and to mix with the whey.</p> <p>Near large towns where there is a great demand for milk and curd people sometimes take off the crust or cream and sell the milk in a raw or curdled state. The cream is then churned and the butter obtained is melted into <i>ghi</i> in the usual way. Generally speaking, however the manufacture of <i>ghi</i> is confined to villages where there are no purchasers for milk as it is more profitable to sell milk in the raw state than to convert it into <i>ghi</i>.</p> <p>In certain localities such as the Monghyr and Bhagalpur districts butter is extracted by churning the raw milk either fresh or after being boiled. The milk is then sold either raw or curdled and <i>ghi</i> is made by heating the butter.</p> <p>In the Tippera district milk is first boiled down to the consistency of a thick hard jelly, thus forming a substance known as <i>khur</i> in Bengal and <i>khoya</i> in Upper India which is eaten as a delicacy and enters largely into the composition of most of the native sweetmeats. This substance is ground on a stone, placed in an earthen or a metallic vessel reduced to a liquid state by mixing water with it and then churned. The butter thus obtained when melted is said to yield a superior quality of <i>ghi</i>.</p> <p><i>In Rajputana</i>—The process adopted differs somewhat from that detailed above and is thus described by A. Wingate, Esq., O.I.E., Settlement Officer, Meywar—</p> <p>‘The milk is slowly boiled on a cowdung cake fire and occasionally stirred with an iron spoon to prevent it boiling over. A little whey is poured in to make the cream rise. The white curds are then skimmed off and kept in earthen or brass pots till a sufficient quantity is collected. These curds are then poured into a large earthen vessel and some warm water added. The churn called <i>rawai</i> is at once put in and worked by a woman. From time to time cold water is freely added. The butter is then collected with the hand into a similar earthen pot and heated till it melts. The melted butter is then laid aside to cool and is thenceforth known as <i>ghi</i>. The best <i>ghi</i> is white like soft lard and has no smell, and keeps good for almost any length of time.</p> <p>Every household makes its own <i>ghi</i>, and the ‘<i>chach</i>’ or watered skim milk is much used for drinking at meals with Indian corn porridge or baked cakes. The villagers in making <i>ghi</i> mix all their milk up together, whether obtained from the cow, buffalo or goat and the shepherd classes also add the milk of their sheep. Consequently <i>ghi</i> sold in the bazárs is frequently very strong in smell and taste, and of reddish yellow colour.</p> <p>‘The amount of <i>ghi</i> from a given quantity of milk depends altogether upon the feeding of the cattle. Most families keep one or two milch kine and buffaloes at home and feed them well. Such cattle, they say, give</p>

Ghi or Clarified Butter. (J Murray)	GHI
<p>about two ounces of <i>ghí</i> per seer of buffalo's milk and one ounce or less per seer of cow's milk. Goat's milk gives about four ounces and sheep's milk less than an ounce of <i>ghí</i> per seer."</p> <p>The Agent to the Governor General also states —</p> <p>In Rájputana, <i>ghí</i> ordinarily sold in the market is chiefly derived from the milk of the sheep which though decidedly lesser in quantity, is thicker in composition and richer in butter than that from the buffalo. The outturn of Rájputana <i>ghí</i> chiefly depends on the large flocks of sheep reared in this part of the country by Jats Gujars and other agriculturists. A flock of 100 sheep can be maintained at less expense than 10 buffaloes and yet the outturn of milk and butter is nearly treble. Sheep's milk is said to have medicinal virtues which give it a superior rank. The butter is whiter than that of the buffalo and excels it in fragrance and taste.</p> <p>In Madras — The process of manufacture has been described as follows by Mr Robertson — In making <i>ghí</i> the first object is to get the butter thoroughly separated from the milk in as pure a condition as possible. This is secured by placing the can or vessel containing the freshly-drawn milk in an earthenware vessel of boiling water for about 5 minutes. The milk after being thus exposed to a temperature of about 212 degrees is poured into another vessel and butter milk is added from two to three drops in hot weather to a tea spoonful in cold weather per quart of milk. The vessel with the milk is put aside for 24 hours and the milk is then churned. The yield of butter averages from about 1½ to 2 ounces per quart of milk but of course varies greatly. The butter is next melted in an open vessel over a slow fire the heat coagulates the caseine which with other impurities sinks to the bottom of the vessel. Boiling is continued for from 15 to 20 minutes when most of the water is evaporated into the air and the <i>ghí</i> clear and bright rests on the heavier sediment covering the bottom of the vessel. The <i>ghí</i> when cold is carefully poured off leaving the sediment behind and is fit for immediate use or for storing for future use. The outturn of <i>ghí</i> varies with the quality of the butter and the purity of the <i>ghí</i> made—an average outturn of 50 to 60 per cent of the weight of the butter used when the butter is made from the milk of the cow. The yield of <i>ghí</i> from buffalo butter is higher. <i>Ghí</i> is never made when a fair price can be obtained for milk or butter. A <i>viss</i> (3½ 2 ozs) of <i>ghí</i> sells usually for about 1s 10½d and to make this not less than 6½ lb of butter or 48 quarts of milk of the cow would be needed. In nearly all the large towns of South India, cow's milk will sell readily at 2½d per quart and butter at 1s 3d per pound. Thus, the milk that would be required to make 3½ 2 ozs of <i>ghí</i> worth 1s 10½d, would as fresh milk sell for about 10s and if churned would yield butter worth 7s 9d.</p>	<p>PREPARA-TION Rájputana.</p> <p>Madras. 193</p>
<p>CHARACTERS QUALITY AND YIELD OF GHI.—The ordinary <i>ghí</i> of the bazárs is principally derived from buffalo milk which is not only obtained in greater quantity from one animal but is richer in butter than that of the cow. One quart of buffalo milk yields about three ounces of <i>ghí</i> while the same quantity of cow's milk only affords about one ounce and a half. Reports from the Panjáb and Bombay however appear to indicate that the difference is not always so great since the quantity obtained from cow's milk is said to be only one fourth less than that derived from buffalo milk. There is no doubt that the food given to the cow is an important element in deciding the amount of butter obtainable cotton seed and oil-cake especially making a great difference in the amount of fatty matter in the milk. Careful experiments by Mr E J Kilts Assistant Commissioner in the Hyderabad Assigned Districts gave the following results — 'One buffalo in milk gives about 4½ seers (6½ qts) of milk per diem and nearly 9 seers (12 qts) of milk are required to obtain one seer (32 ozs) of butter. When</p>	<p>YIELD 194</p>

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YIELD

warmed and strained the butter becomes *ghi* and in the change it loses 25 per cent of its weight. On the average therefore, each buffalo milk gives the equivalent of two fifths of a seer (12½ ozs) of *ghi* per diem."

In Bundelkhand Rájputana and other localities *ghi* is also made from sheep and goat's milk. That of the latter is inferior owing to the disagreeable odour it possesses while *ghi* made from the former is said to be better in many ways than that of the buffalo.

In many parts of the country *ghi* obtained from cow's milk is highly esteemed owing partly to its superior quality and partly to its greater purity from a religious point of view. It is however always dearer than buffalo milk *ghi* not so easily procurable and is moreover more liable to deterioration. It is of a yellowish colour and has a more pleasant odour and agreeable taste than that prepared from buffalo milk.

The following statement of the comparative yield from different kinds of milk drawn up by the Superintendent of the Government Farm Cawnpore may be here given —

Cattle	Weight of fresh milk	Weight of boiled milk	Weight of curdle	Weight of Matha (curdle & water)	Weight of Nannu (ram <i>ghi</i>)	Weight of <i>ghi</i>	Percentage of <i>ghi</i> over fresh milk
Buffalo (first testing)	lb oz 22 8	lb oz 21 0	lb oz 20 14	lb oz 23 7	lb oz 1 3	lb oz 0 12½	3 47
Buffalo (second testing)	20 0	18 0	17 6	19 2	1 1	0 11	3 43
Cow (first testing)	20 0	17 11	17 0	19 2	0 12	0 8	2 5
Cow (second testing)	20 0	18 1	17 6	19 0	0 13	0 8½	2 34
Cow (third testing)	10 0	9 0	8 10	9 15	0 6	0 4	2 5
Goat (first testing)	24 4	22 0	21 8	24 5	0 13	0 9½	2 44
Goat (second testing)	20 0	17 13	17 6	19 10	0 14	0 8½	2 65
Sheep	6 0	5 8	5 4	6 15	0 6	0 4½	4 6

ADULTERANTS
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ADULTERANTS.—The chief articles employed in adulterating *ghi* are vegetable oils animal fat especially mutton fat and starches. Of the last the commonest are rice flour flour of *bajra* millet (*Pennisetia spicata*) ripe plantain and the starch obtained from the boiled tubers of *Ipomoea Batatas* and *Colocasia antiquorum*. Of vegetable oils the oils of cocoa nut poppy seed sesamum *mahuá* (*Bassia latifolia*) and *kokam* (*Garcinia indica*) are most frequently employed and occasionally also raw castor oil. Besides these other impurities occur resulting from imperfect heating and careless preparation. Several methods of purification are adopted the commonest being to boil the *ghi* dash cold water on it while in a state of ebullition and then to separate the pure oil which on cooling floats on the surface. In Rájputana fresh milk is mixed with the impure *ghi* in the proportion of one of the latter to four of the former and the whole process of manufacture is repeated. In certain other localities purification is effected by heating the *ghi* with leaves of lemon.

PACKING
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PACKING.—Formerly all *ghi* was packed for local use in earthen jars and for transport to a distance in leathern cases called *kuppas*. Of late years however, old kerosine tins, and new tins of the same shape and size, have come into almost universal use in all cases in which the *ghi* is required for transport by sea or rail. In Madras, Rájputana, and Sind, however,

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though the kerosine tin is gradually superseding the older method skin *kuppas* are still extensively employed and in Bengal the only receptacle used for transporting *ghí* to Calcutta by river is the old earthen jar or *matka*. In Madras and Bombay, zinc cases either shaped in imitation of a *kuppa* or of a kerosine tin, and wooden casks are also employed but only to a limited extent.

PRODUCTION AND CONSUMPTION—The principal *ghí* producing tracts are the North West Provinces and Oudh Bengal Rájputana the Central Provinces and the Panjáb or in other words the most densely populated and highly cultivated parts of the country. Bombay also produces a small quantity but obtains its chief supply by importation. Regarding consumption Mr T N Mukharji writes. Roughly speaking about a fourth of the total population use *ghí* at an average rate of 8lb per head per annum. In a population of nearly 300 millions this rate would give an annual consumption of 267 000 tons the value of which at the rate of £45 per ton would amount to more than £8 000,000. The provincial rates which are a little in excess of this figure are as follows—Madras 33 000 tons Bombay and Sind 22 000 tons Bengal 74 000 tons North West Provinces 63 000 tons Panjáb 54 000 tons Central Provinces 10 000 tons, rest of India 44 000 tons—the total amounting to 300 000 tons.

Medicine—*Ghríta* has long been regarded as a substance of medicinal value by Hindu practitioners. U O Dutt writes. That obtained from cow's milk is considered superior to that prepared from the milk of the buffalo and is preferred for medicinal use. Clarified butter is considered cooling emollient and stomachic. It increases the fatty tissues and mental powers improves the voice beauty, and complexion and is useful in eye diseases retained secretions insanity tympanitis painful dyspepsia ulcers wounds &c. It is also employed extensively as the basis of a form of medicinal preparation called *ghritapáka*. This is prepared as follows—

The *ghrita* or clarified butter is first of all heated on a fire so as to deprive it of any water that may be mixed with it a little turmeric juice is then added to purify it as it is said but the object I suppose must be to colour it. *Ghríta* thus purified is placed on a fire in an earthen copper or iron pan and melted with a gentle heat. Then the medicinal paste and fluids to be used are added and the whole boiled together till the watery parts are all evaporated and the *ghrita* is free from froth. It is then strained through cloth and preserved for use (U C Dutt, *Mat Med of the Hindus*).

These *Ghrítapáka* are prepared in three varieties by different degrees of boiling the first *mridupáka* is a soft paste the second *madhyamapáka* is just soft enough to be made into pills, the third *kharapáka* is hard and dry. The underboiled form is said to be useful as snuff the intermediate is preferred for internal administration and the overboiled variety is employed for external application. *Purána ghríta* or *ghí* more than ten years old is a much prized external application in Hindu medicine. U O Dutt writes. It has a strong pungent odour and the colour of lac. The longer this old butter is kept the more efficacious it is said to prove. Clarified butter a hundred years old is often heard of. The richer natives have always a stock of old *ghrita* of this description which they preserve with care for their own use as well as for distribution to their poorer neighbours. 'Old clarified butter is used externally. It is first repeatedly washed with cold water and then rubbed with it till it is reduced to a soapy frothy fluid, which is used as a liniment. It is regarded as cooling and emollient, and is much used in nervous diseases such as insanity epilepsy neuralgia paralysis cephalalgia, and asthma; also in rheumatic affections stiff joints burning of the body, hands or feet affections of the

PRODUCTION
&c
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MEDICINE.
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GHI	Ghi or Clarified Butter												
MEDICINE	eyes &c It is much valued as an application for reducing the temperature in high fever												
FOOD 199	Food — <i>Ghi</i> has long been one of the most important articles of diet of all classes who can afford it in India Linschoten makes frequent reference to its extensive employment in Sindh Bombay and other places which he visited along the coast in his travels The <i>Ain-i Akbari</i> contains it in the list of more important articles of food during the reign of Akbar and reference is frequently made to <i>ghrita</i> in many ancient Sanskrit works It is used in much the same way as butter in European cookery being employed in the preparation of vegetables curries pulses meat rice <i>palao</i> &c It is also eaten uncooked with bread or boiled rice and enters into the composition of the sweetmeats and pastry so extensively consumed by the population of all large towns The poorer classes reserve the use of <i>ghi</i> as a luxury for feast days and festivals and substitute for ordinary consumption some of the sweet vegetable oils												
DOMESTIC 200 SACRED 201	Domestic and Sacred uses —In parts of India where vegetable oils are expensive <i>ghi</i> is said to be employed by women for dressing the hair &c <i>Ghi</i> prepared from cow's milk is largely used in many religious and social ceremonies of the Hindus thus it is burnt as an offering to the fire god (<i>Agni</i>) and with sandal wood in Bombay to invoke Lakshmi												
PRICES 202	Prices and Trade —Reports submitted at different times to the Revenue and Agricultural Department indicate that as a rule the selling price of <i>ghi</i> ranges between 5 <i>d</i> and 7 <i>d</i> per lb In Bombay Madras Calcutta and other large centres of demand however the price ranges as high as 11½ <i>d</i> to 1 <i>s</i> for first quality <i>ghi</i> and as already stated that prepared from the milk of the cow always fetches a higher price than that made from buffalo milk Though by far the greatest proportion of <i>ghi</i> prepared within the country is consumed in India a considerable trade exists with trans frontier countries and also with foreign ports principally Mauritius the Straits Settlements and other colonies where well to do Native emigrants can afford to purchase it As might be expected from the almost universal consumption of the article the inter provincial trade returns shew a large traffic in <i>ghi</i> The following figures indicate the trade by rail and river during the year 1888-89 including the Indus borne traffic between the Panjáb and Sind that between Bengal and Assam by the Brahmaputra and Megna and the trade to and from Calcutta by river The North Western Provinces and Oudh exported 188 521 maunds Bengal 85 587 maunds Madras 42 019 maunds, the Panjáb 25 633 maunds the Central Provinces 20 811 maunds and Berar Bombay Assam and Sind smaller amounts Of the large towns excluded in the above figures Calcutta exported 24 903 maunds Karachi 10 863 maunds Bombay 4 498 maunds and Madras 477 maunds The largest amounts imported were by Calcutta 1 43 897 maunds Bombay town 98 894 maunds Madras seaports 32 907 maunds Sind (excluding Karachi) 36 047 maunds Bengal 31 440 maunds Bombay 29 380 maunds Rájputana and Central India 27 840 maunds and the Panjáb 25 196 maunds												
TRADE 203	An extensive import trade is carried on with the frontier states the amount and value of which for the past three years has remained remarkably uniform The figures are —												
Inter-provincial 204													
Trans-frontier 205													
	<table><tr><td></td><td>1885 86</td><td>1886 87</td><td>1887 88</td></tr><tr><td>Amount in cwt</td><td>63 658</td><td>54 073</td><td>58 591</td></tr><tr><td>Value in ₹</td><td>22 56 545</td><td>19 39 985</td><td>21 20 917</td></tr></table>		1885 86	1886 87	1887 88	Amount in cwt	63 658	54 073	58 591	Value in ₹	22 56 545	19 39 985	21 20 917
	1885 86	1886 87	1887 88										
Amount in cwt	63 658	54 073	58 591										
Value in ₹	22 56 545	19 39 985	21 20 917										
	The principal sources of supply are Kashmir and Nepál the latter of which in 1887-88 supplied 14 995 cwt the former 34 153 cwt There is also a small export trade which however is almost entirely confined to Upper Burma Kashmir and trans frontier by the Sind Pishin Railway the <i>ghi</i>												

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(J Murray)

GHI

thus exported being consumed almost entirely by Indian troops and followers

The imports from foreign countries represent a large and constantly increasing trade but bear a very small proportion to the figures representing the trans-frontier and inter provincial trades. There appears to be little doubt that if a source of cheap supply could be found the consumption and consequently the imports from foreign countries might become very greatly increased. The average import for the past five years has been 1 980 700lb value £7 14 122 in comparison with 431 912 lb, value £1 22,459 of the five years immediately preceding. It may be noted also that the imports of the year 1888-89 increased to 2 731 280lb, in comparison with 1 382,380lb in 1884-85. The imports are almost entirely into Bombay and Karachi: the sources of supply are Turkey in Asia, the neighbouring pastoral tracts of Southern Baluchistan, and the shores of the Persian Gulf.

As in the case of the trans frontier trade the chief foreign markets to which ghi is exported are Mauritius the Straits Settlements Aden and other similar colonies where well to-do Indian emigrants supply a market. A certain amount is also exported to the neighbouring coasts of Africa and Asia, and a small quantity is dispatched to the United Kingdom possibly for re-export to some of the colonies. The average export for the past five years has been 1 938 092lb value £7 10 287 or almost exactly equal to the average import, and shews little change in comparison with that of the five years ending 1883-84 which was 1 659 613lb value £5 83,423.

The coasting trade is a large and increasing one but, like the trans frontier exports its most remarkable feature is the transport of ghi to Indian consumers in non producing districts. In 1888-89 the total export from Bengal was 1 322 530lb value £4 87 575 from Bombay 1 181 542lb value £4 33 303 from Sind 136,465lb value £49 856 from Madras 2 182 832lb value £6 88 736 and from Burma 23 068lb value £9,112. By far the largest importer was Burma which recorded 3 412 644lb value £13 05 499 chiefly from Madras and Bengal. The probable reason of this large consumption in a country the Buddhist inhabitants of which do not employ ghi as an article of food to any extent is probably the large and increasing population of emigrants from Madras Bengal and other provinces of the main peninsula.

In 1881 an endeavour was made by the Government of India to give an impetus to Indo-Australian trade by establishing a return trade, the absence of which greatly augments the price of exported Indian goods by causing high shipping rates. It was considered that the only article besides animals timber and metals which could profitably be thus sent to India was ghi for the production of which the northern portion of South Australia appeared to possess many advantages. Sir E O Buck accordingly drew out a memorandum drawing the attention of the Australians to the subject and suggesting the methods by which such a trade might be most profitably and advantageously commenced. As an outcome of this suggestion, buffaloes and ghi makers were asked for and were supplied by the Government of India in 1883. Experiments were started at Port Darwin with the result that the buffaloes were found to thrive well and to breed healthy calves and excellent ghi was produced which obtained a gold medal at the Calcutta Exhibition in 1884. The initial cost was necessarily high in proportion to the smallness of the herd and accordingly, the success of the experiment from a commercial point of view is not as yet established. The industry is one however that appears to have a hopeful future. The demand is a large and constantly increasing one the climate of the northern territory of South Australia is admirably suited

TRADE.

Foreign
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Coasting
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Australian
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**GIRARDINIA
heterophylla****Bamboos, The Nilghiri Nettle****TRADE
IN GHI**

for buffaloes and if managed with due attention to the prejudices of the consumers and by the help of imported Indian labour there appears to be every likelihood of such an enterprise affording a good return

GIGANTOCHLOA, Kurz For Fl Burm, II, 555

A genus of evergreen densely tufted bamboos, which are employed for the same purposes as other members of the Tribe *BAMBUSEÆ*. For information regarding these the reader is referred to Vol I, 370. The following are the principal Indian species —

209 Gigantochloa albo ciliata, Kurz, For Fl Burm, II, 555.

[GRAMINEÆ

Syn — *OXYTENANTHERA ALBO-CILIATA, Munr*Vern — *Wapyugale* BURM

Habitat — Common in the mixed forests of Pegu and Martaban

210 G andamanica, Kurz, For Fl Burm, II, 556Vern — *Poddk* AND

Habitat. — Common in the mixed forests of the Andamans

211 G auriculata, Kurz For Fl Burm II, 557Vern — *Talagawa* BURM

Habitat — An evergreen arboreous tufted bamboo found in the low forests of Southern Pegu but rather rare cultivated in villages of Arracan and Chittagong. A useful timber with very strong stems

212 G macrostachya, Kurz For Fl Burm, II, 557Vern. — *Wanet* BURM

Habitat — Not unfrequent in the tropical forests of Martaban and Tenasserim, also cultivated in the villages of the Irrawaddi valley and of Arracan

Ginger, see *Zingiber officinale* Roscoe SCITAMINEÆGinger Grass, see *Andropogon Schoenanthus*, Linn Vol I, 249Gingelly Oil, a name in India for an oil obtained from *Sesamum indicum*, DC PEDALINEÆ which see**GIRARDINIA, Gaud, Gen Pl, III 384**

A genus of annual or perennial herbs belonging to the Natural Order URTICACEÆ

213 Girardinia heterophylla, Dcne Fl Br Ind, V, 550; Wight, Ic, 1 687, URTICACEÆ**THE NILGHIRI NETTLE**Syn — *URTICA HETEROPHYLLA Vahl* U *DIVERSIFOLIA* and *HORRIDA* Link U *PALMATA* ForskVar *PALMATA* GaudVar *ZEYLANICA Dcne* SYN — *URTICA HETEROPHYLLA Wight* U *ZEYLANICA* BurmVern — *Awa alla bichua, chichr*, HIND; *Horé surat*, ASSAM *Sorpa herpa* BHUTIA *Ullo* NEPAL; *Kasu Lepcha Shishuna awa-bichhu*, KUMAON *Kali, kubra, jurkunkundalu kundalu* GARHWAL; *En, kori, kingi, sanoli, ányán kárla, kal, bhábar* PB; *Moti khujati* MAR; *Ana schorigenain* MALAY *Betya, bekshá, phetyákyi*, BURM *Gass kaham bilya*, SINGReferences — Roxb *Fl Ind* Ed C B C, 655; *Brandis, For Fl* 404 *Gamble Man Timb* 323 *Dals & Gibs, Bomb. Fl.* 308; *Stewart, Pb Pl* 215; *Mason Burma and Its People* 775 *Atkinson, Him Dist* 317 797; *Rheede, Hort Mal, II, t 41* *Drury, U Pl*, 295 *Lasboa, U Pl*

The Nilghiri Nettle (J Murray)

GIRARDINIA
heterophylla.

Bomb, 234, *Royle Fib Pl* 367 372 *Liotaud Paper making Mat* 512
Forbes Watson Rep on Rhea Fibre 1875 39; *On the Preparation and Use of Rhea Fibre* 1883 35, *Watt Sel from the Rec of the Govt of India* 177 260 319, *Agri Hort Soc of India Trans VIII* 75, 275
Fours (Old Series) VI 44, *VII* 223; *Spens Encyclop* 990; *Bal Jour, Cyclop*, I, 1207 *Indian Forester XII*, App, 21; *XIV* 269, 273 *Special Reports from Forest Department, N W P, Madras and the Panyab*

Habitat.—A tall stout erect tufted herb from 4 to 6 feet high, exceedingly common in the temperate and sub tropical Himalaya, from Marri eastwards, ascending to an altitude of 5000 feet It is also to be met with in Assam, Sylhet and Burma and extends from Marwar and Central India to Travancore and Ceylon The variety *palmata* is a native of the Nilghiri hills and Ceylon while *zeylanica* is confined to the latter locality and parts of the Deccan

Fibre.—Considerable confusion exists in the literature of the fibres yielded by this species apparently owing to a neglect of the fact that the three varieties afford fibres which are perfectly distinct in many of their characters. It is therefore necessary in the present article to consider the varieties separately as far as the fibre of each is concerned

G heterophylla proper—The Himalayan nettle is extensively employed in the localities where it abounds Its stems are often employed for making twine and ropes by the dry process but these are not prized and perish quickly from wet" (*Stewart*) Yields a fine strong fibre, much used for cordage and twine but cannot stand much moisture" (*Atkinson*) *Dr Forbes Watson* in his report upon Rhea Fibre, publishes under this species certain facts regarding what appears to be the fibre of *var palmata* and reproduces *Wight's* plate of *var zeylanica* as representing the typical species This same mistake has been made by other authors all the economic information regarding *Girardinia* being confused and given under one or other of the above names Under the heading of Other Himalayan Nettles *Dr Royle* gives certain facts regarding what appears to be the fibre now under consideration Having arrived at the conclusion that the *horu surat* of Assam was identical with the fibre of the Nilghiri nettle of Southern India he apparently could not reconcile himself to class with these the *babar* of the Himalaya, nor the fibre from which the *bangra* cloth of Sikkim was made. Presumably therefore, he merely classed the Assam fibre with that of the Nilghiri nettle from descriptions he had received, and not from actual observation Had he actually seen the fibre he must have assigned it a place with the fibres of the North-West Himalaya nettle with which it is in reality identical The following description of the method of preparation pursued near Simla, given by *Captain Rainey* and quoted by *Royle*, may be here reproduced as being the most complete account available In August and September, when the plant is in perfection, it can be obtained in any quantity, running from five to six or seven feet in height The following is the preparation to which the article is subjected by the natives of the place but, I doubt not much of the process might be omitted or simplified—

- "1st—Being cut in August or September the weed is exposed for one night in the open air
- "2nd—The stalk is then stripped of leaves and dried in the sun
- "3rd—When well dried it is deposited in an earthen pot which contains water mixed with ashes (the refuse remains of any wood fire) and boiled for four and twenty hours
- "4th—The stalk thus boiled is then taken to a stream and well washed
- "5th—The hemp is then brought home and being sprinkled with flour (*atta*) (of the grain called *Koda*) it is again dried in the

FIBRE
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**GIRARDINIA
heterophylla****The Nilghiri Nettle****FIBRE**

sun and afterwards spun at any time into cords for nets of every description

In Garhwāl and other localities in the North West Himālaya a simpler method appears to be followed. The plant is cut down in the beginning of the cold season the stalks are washed three or four days in water and the fibre is stripped off like that of hemp. It is a fine white glossy silky fibre but is coarser and more brittle than that yielded by *var palmata*. According to **Captain Rainey** it is extensively employed in the preparation of twine for fishing nets in consequence of the virtue ascribed to it by the Natives of gaining increased strength by immersion in water and of resisting decay longer than other fibres. It is also used in Sikkim for the manufacture of a coarse cloth like gunny.

Var palmata—the true Nilghiri nettle—yields a finer and more valuable fibre than *G heterophylla* proper. **Royle** writes. The fibre is very long white soft and silky and has been much admired by many of the best judges of fibres. The hill people on the Nilghiri hills prepare the fibre by boiling the twigs. **Dr Wight** says of it that it produces a beautiful fine and soft flax like fibre which the Todawars use as a thread material and if well prepared is fitted to compete with flax for the manufacture of even very fine textile fabrics.

At Dundee it was thought a very good fibre but rather dry. **Mr Dickson** who has passed it through his machine and liquid has rendered it like a beautiful soft silky kind of flax and calls it a wonderful fibre of which the tow would be useful for mixing with wool as has been done with the China grass and the fibre used for the finest purpose. **Dr Forbes Watson** speaking of what is apparently this variety says. The remarks made with respect to the rough character of the Rhea fibre are still more applicable to those of the Nilghiri nettle. Indeed so similar to wool is its fibre that when cut short and crumpled up or scribbled I have known it valued by an experienced broker as wool and its price stated accordingly. The term vegetable wool which it has already received is therefore very suitable. The same writer gives the mean diameter of the ordinary fibre as $\frac{1}{160}$ and the ultimate fibre as $\frac{1}{1000}$ of an inch and **Cross Bevan and King** give the following analysis. Moisture 7.3 ash 1.5 hydrolysis (a) 2.5 (b) 9.7 cellulose 89.6. In **Spon's Encyclopædia** the Girardinias are spoken of collectively under the name of *G heterophylla* but it seems that *G palmata* alone is meant. The following extract may be found useful. It succeeds well by cultivation. The bark abounds in fine white glossy strong fibres which have a rougher surface than those of *Boehmeria nivea*, and are therefore more easily combined with wool in mixed fabrics. Owing to the high percentage of cellulose and the small loss from hydrolysis the fibre is chemically one of the best produced in India.

The late **Mr M Ivor** of the Government gardens Ootacamund experimented with the Nilghiri plant and submitted a most interesting report to the Madras Government. The following extract from *Drury's Useful Plants* will be found to contain briefly the more important facts from **Mr M Ivor's** report —

Cultivation —The Nilghiri nettle has been described as an annual plant it has however proved at least in cultivation to be a perennial continuing to throw out fresh shoots from the roots and stems with unabated vigour for a period of three or four years. The mode of cultivation therefore best suited to the plant is to treat it as a perennial by sowing the seeds in rows at fifteen inches apart and cutting down the young shoots for the fibre twice a year — *viz* in July and January. The soil best suited to the growth of this plant is found in ravines which have

The Nilghiri Nettle

(7 Mur.)

**GIRARDINIA
heterophylla****CULTIVA
TION**

received for years the deposit of alluvial soils washed down from the neighbouring slopes. In cutting off the first shoots from the seedling crop about six inches of the stem is left above the ground this forms stools from which fresh shoots for the succeeding crops are produced. After each cutting the earth is dug over between the rows to the depth of about eight inches and where manure can be applied it is very advantageous when dug into the soil between the rows with this operation. When the shoots have once begun to grow no further cultivation can be applied as it is quite impossible to go in among the plants owing to their stinging property. The plant is indigenous growing all over the Nilghiris at elevations varying from 4 000 to 8 000 feet. This indicates the temperature best suited to the perfect development of the fibre.

Produce per acre—From the crop of July an average produce of from 450 to 500lb of clean fibre per acre may be expected. Of this quantity about 120lb will be a very superior quality this is obtained from the young and tender shoots which should be placed by themselves during the operation of cutting. The crop of January will yield on an average 600 or 700lb per acre but the fibre of this crop is all of a uniform and somewhat coarse quality owing to shoots being matured by the setting in of the dry season in December. It might therefore be advantageous where fine quality of fibre only is required to cut the shoots more frequently probably three or four times in the year as only the finest quality of fibres is produced from young and tender shoots.

PREPARATION OF THE FIBRE—Our experiments being limited, our treatment of the fibre has been necessarily very rude and imperfect as in this respect efficient appliances can be obtained only in extensive cultivation.

**PREPARA
TION
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The inner bark of the whole plant abounds in fibre that of the young shoots being the finest and strongest while that of the old stems is comparatively short and coarse though even they produce a fibre of very great strength and of a peculiar silky and woolly like appearance and one which no doubt will prove very useful in manufactories.

For cutting down the crop fine weather is selected and the shoots when cut are allowed to remain as they fall for two or three days by which time they are sufficiently dry to have lost their stinging properties they are however pliable enough to allow of the bark being easily peeled off the stems and separated from the leaves. The bark thus taken from the stems is tied up in small bundles and dried in the sun if the weather is fine if wet is dried in an open shed with a free circulation of air. When quite dry the bark is slightly beaten with a wooden mallet which causes the outer bark of that in which there is no fibre to break and fall off. The fibrous part of the bark is then wrapped up in small bundles and boiled for about an hour in water to which a small quantity of wood ashes has been added in order to facilitate the separation of the woody matter from the fibre. The fibre is then removed out of the boiling water and washed as rapidly as possible in a clear running stream after which it is submitted to the usual bleaching process employed in the manufacture of fibre from flax or hemp. *Report April 1862 (Drury's Useful Plants 225)*

Var zeylanica—Little is known regarding the fibre of this variety although it is used in the Konkan and other parts of Western and South Western India. It would appear however that it is very similar to that produced by the true Nilghiri nettle described above.

There is no doubt that these fibres are perhaps the strongest and in many ways most valuable, of any produced in India a very serious practical difficulty exists however against their extensive use in the stinging hairs with which all the varieties are abundantly provided. These cause

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GISEKIA
pharnaceoides
A Valuable Anthelmintic
**PREPARA
TION**

great annoyance to the persons employed in extracting the fibre, and even after being manufactured into cloth the irritant property may not be completely destroyed. Indeed in many cases it persists to such an extent as to cause great irritation to the person wearing or even touching the cloth.

**FOOD
Leaves
217**

Food — The LEAVES of *G. heterophylla* proper are said to be largely used as a vegetable in the hilly tracts of the North West Provinces.

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GIRONNIERA, Gaud, Gen Pl III, 356

Gironniera reticulata, Thw Fl Br Ind V, 486 URTICACEÆ

Syn — *GIRONNIERA CUSPIDATA Kura* SPONIA SUBSERRATA *Kura* AP HANANTHE CUSPIDATA *Planch* GALUMPITA CUSPIDATA *Blume* CY CLOSTEMON CUSPIDATUM *Blume* HELMINTHOSPERMA GLABRESCENS *Thwaites* mss. *CELTIS RETICULATA H f & T*

Vern — *Kho manig* NILGHIRI HILLS *Kodituni* TAM

References — *Kura* *For Fl Burm II 470 Beddome Fl Sylv t 313 Gamble Man Timb 324 Balfour Cyclop I, 1208 Indian Forester II 21, 22 III 23*

Habitat — A lofty tree native of the Sikkim Himālaya at altitudes of 1 000 to 3 000 feet also met with in Assam the Khasia Mountains Upper Burma South Western India and Ceylon distributed to Java.

**TIMBER
219**

Structure of the Wood — Very hard and heavy a valuable engineering timber (*Beddome*)

GISEKIA, Linn Gen Pl III 80
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Gisekia pharnaceoides, Linn Fl Br Ind II 664 Wight Ic [II 1167 1168 FICOIDEÆ

Syn — *GISEKIA MOLLUGINOIDES Wight* G LINEARIFOLIA *Schum* PHAR NACEUM OCCULTUM *Forsk*

Vern — *Manahie kura* nummnelli *kirai*, TAM *Isikedunti kura* *isaka* *dasari kura* TEL, *Aetrilla palla* SING

References — *Kura* in *Journ Linn Soc 1877 pt II 111 Elliot Fl Andhr 71 Pharm Ind 183 Drury U Pl 227 Lisboa U Pl Bomb 200, Birdwood Bomb Pr 69 Home Dept Cor regarding Pharm Ind 240 Gazetteer of the N W P I 83 IV lxxv, Indian Forester III 236 Jour Agri Hort Soc of India (Old Series) IX 285*

Habitat — A glabrous herb found in the Panjāb Sind South India and Ceylon distributed to Ava Afghanistan and Africa.

**MEDICINE
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Medicine — The medicinal virtues of this plant were first brought to notice by Captain W H Lowther in the Journal of the Agri Horticultural Society of India above cited. He claimed for it strong anthelmintic properties and considered it when properly administered a specific for tænia or tape-worm. The treatment is described as follows. I prefer the administration of the remedy when the plant is forming its seed vessels (all vegetable products being then fullest of their medicinal virtues). An ounce or more of LEAVES STALKS and CAPSULES taken indiscriminately are ground in a mortar and sufficient water is added to form a draught. The patient should fast for twelve hours previous to taking the medicine and three such doses should be given one every four days. To destroy any latent germs give for precaution sake additional doses for two fort nights following. Captain Lowther's estimate of the drug is very high and his results with the fresh plant which he urges must alone be used since it loses its value on drying appear to have been good. As yet how ever no medical evidence in favour of the alleged virtues of *Gisekia* have been adduced and in the Home Department correspondence on the advisability of bringing out a new edition of the Indian Pharmacopœia none

**Leaves
222
Stalks
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Capsules
224**

Givotia, Glass (J Murray)	GLASS
<p>of the authorities consulted appear to have recommended the retention of this drug</p> <p>Food—Balfour states that the LEAVES are used by natives in the preparation of <i>dal</i> and Lisboa mentions that in time of famine they are employed as a pot herb</p>	<p>MEDICINE</p> <p>FOOD LEAVES 225</p>
<p>GIVOTIA, Griff <i>Gen Pl</i>, III 297</p> <p>Givotia rottleriformis, Griff; <i>Fl Br Ind V</i> 395 <i>Wight Ic</i> [t 1889 EUPHORBIACEÆ</p> <p>Syn—GOVANIA NIVEA Wall</p> <p>Vern—Vendale <i>butallū bulalū</i> TAM <i>Tella punkū tella ponuku</i> TEL <i>Polki</i> MALAY</p> <p>References—Brandis <i>For Fl</i> 442 <i>Beddome Fl Sylv t</i> 285 <i>Gamble Man Timb</i> 365 <i>Dals & Gibs Bomb Fl</i> 228 <i>Filhot Fl Andhr</i> 178 <i>Lisboa U Pl Bomb</i> 124 <i>Kew Off Guide to the Mus of Fc Bot</i> 118 <i>Indian Forester III</i> 204; <i>Bomb Gas XV</i> 70</p> <p>Habitat—A small tree of the Dekkan Mysore the Eastern Ghāts and Ceylon</p> <p>Oil—The SEEDS yield an oil which is valuable as a lubricant for fine machinery</p> <p>Structure of the Wood—White exceedingly light very soft but even grained Weight 14lb per cubic foot It is employed for making carved figures toys imitation fruit boxes and other fancy articles also for catamarans The Kanāra Gazetteer contains the further information that its surface takes paint readily</p>	<p>226</p> <p>OIL SEEDS 227 TIMBER 228</p>
<p>GLASS</p> <p>Vern—Kanch HIND; Kunnadi TAM <i>addannu</i> TEL <i>Shishah</i> PERS <i>Kisās</i> ARAB</p> <p>Glass is a mixture of silicate of potassium or sodium or of both with one or more silicates insoluble in water such as those of the alkaline earths aluminium manganese iron or lead The mixture is effected by fusion which takes place less readily the more silica it contains Silica for the manufacture of glass is obtained from ground quartz or flint or from silicious sand treated with a mineral acid to free it from metallic impurities The alkali is derived from pearl ash or wood ash carbonate of soda native or artificially prepared soda or from other available sources The necessary insoluble constituent may be obtained from any mineral yielding one of the above mentioned elements as desired India abounds in materials which readily yield these necessary constituents Perhaps the simplest of these is <i>reh</i> which contains soda in the form of carbonate and a large quantity of silica ready mixed Notwithstanding the abundance of this and other glass forming materials glass making in India has not advanced beyond the first and very rudest stage Too much alkali is employed and too little heat given with the not unnatural consequence that the resulting material is a coarse impure dirty coloured mass full of flaws and air bubbles unfitted for any better use than the manufacture of beads coarse bangles and other minor and unimportant articles</p> <p>One reason of this may probably be found in the fact that glass is very little employed in India for the ordinary purposes for which it is used in other countries There is very little demand for glass bottles outside the requirements of Europeans and glass drinking vessels are almost unused by the native population indeed by Hindus earthen vessels are preferred on religious grounds A serious difficulty in the way of the extension of a</p>	<p>229</p> <p>HISTORY 230</p>

GLASS

Glass and Glass ware

HISTORY

glass making industry in this country is the lack of fuel. Mr Baden Powell remarks on this subject. It would probably be cheaper to carry such glass making materials as to be found in the Panjáb to the hearths of Staffordshire and bring them back made up into glass than to attempt the manufacture on a large scale here. Evidence however exists of glass making having formerly existed on a much larger scale than it does at present. At the time of the composition of the *Yajur-veda* glass was one of the articles from which the ornaments of females were made. The substance is also mentioned in the *Mahabharata*. In the *Ain-i-Akbari* glass for windows is included in the list given by its author of building materials and it is said to have cost ₹1 for 1½ s er or 4 dam for one pane. Abul Fazl in his descriptions of Behar and Agra also mentions glass making and writes of Allore. Here are considerable manufactures of woollen carpets and glass. A glass *gulab* bowl and a *hukka* bowl found in the Muham madan capital Bijapur were shewn by Major Cole R E at one of the Simla Art Exhibitions. These he described as probably of the sixteenth century. They were of thick white glass cut or moulded in a hexagonal diaper pattern with fluted necks and of undoubtedly Indian design though of far superior workmanship to anything produced in this country of late years. Now a days indeed the glass-making industry is almost entirely confined to a few families in the Lahore Karnál Jhelam and Hoshiarpur districts of the Panjáb in the Bijnor and Saharanpur districts N W P in Lucknow in Ahmadnagar Kaira and Baroda in Bombay in Seoni Central Provinces in Patna Bengal in Jeypore and in the North Arcot District of Madras. In these localities the glass makers for the most part confine their manufactures to rude globes silvered inside with mercury and tinfoil small coarse glass toys rude bottles for attar, and to a greater extent beads and bangles. In Karnál the large thin pear shaped glass retorts or carboys in which the native manufacture of Salammiac is effected are also prepared.

In some parts of the country however the industry appears to have reached a higher development as will be seen from the following short descriptions taken from the *Journal of Indian Art*. Very curious coloured glass ware is made at Patna. The specimens shewn at the Calcutta Exhibition were of considerable excellence. These articles would have an extensive sale if better known and if proper facilities were afforded to the public for obtaining them. In Delhi and Lahore glass bangles and lamp chimnies are made. In Karnál glass globes pear shaped glass carboys and various wares in Hoshiarpur. The art is as yet quite in its infancy. The Hoshiarpur workman is almost the only one of these who works independently with his own materials—independently that is of foreign aid—for the few glass blowers in Lahore collect fragments of white European glass and melting them down, blow cheap lamp chimnies and bottles. At Karnál the glass globes are made which when silvered inside are broken up into the small mirrors used in *shishadār* ornamental plaster and run into embroideries known as *shishadar phulkaris*.

But the following passage is even of greater interest, since perhaps it describes the only branch of the industry worthy of the name of art manufacture. 'Kapadnanj, in the Kaira district is the only place in the Bombay Presidency where glass is manufactured in its primitive state from a natural earth called *us* which is a mixture of the Carbonates and Silicates of Soda with several mineral impurities. It is however remarkable for its iridescent properties and good colour resembling the antique Venetian. The shapes are quaint and beautiful. It is said that crude glass of the value of about 3 lakhs of rupees is annually sent to Bombay for foreign export by some Bhoras and Banias, and that it is

Patna ware
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Delhi ware
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Lahore ware
233

Kapadnanj
234

Beads
235

Glass and Glass-ware

(F Murray)

GLOCHIDION

purified and turned into various shapes in the glass manufactories of Europe. It would be interesting to find out some more definite statistical account of this trade which though at present represented by a few pots and bottles may if well regulated develop into an important item of the manufactures of Bombay. With reference to the remark regarding the export of this glass it may be noticed that the statement is not supported by the Official Trade Returns which show the value of the exports for the whole of India in 1888-89 to have been only Rs 41,799. White glass phials and other small articles in various colours such as cobalt blue Indian red marbled and dark green are made in the School of Art, Jeypore and by one or two men in the bazar. Glass bracelets or *churrs* of different colours are made at Jeypore and in many other places in the State. They are worn by Mussulmans.

About ten years ago endeavours were made by the Department of Agriculture and Commerce to foster and improve the glass making industry with the double purpose of utilising the abundant glass making material available in the *reh* lands of Northern India and of meeting the demand for glass beads from an indigenous source. An engineer was specially deputed to conduct experiments, beads for patterns, tools and an account of the methods employed in Venice were obtained and furnaces constructed on the English pattern were tried.

It was found as the result of these experiments—

- (1) That the *reh* was not sufficiently pure to make good colourless window glass.
- (2) That the *reh* when heated in a good furnace yielded a material very similar to superior bottle glass but that the furnace required trained skill both in building and working.
- (3) That though good beads could be made they were much inferior to those obtained from Venice and that owing to want of skill on the part of the workmen they could be produced only at a much greater expense. The last result is particularly disappointing since as already remarked beads and bangles are the only form of glass for which a really large demand exists amongst the native population of India.

Trade—A large and increasing import trade exists in glass. In the year 1888-89 6,407,266 superficial feet of sheet and plate glass was imported value Rs 5,61,550. 27,993 cwt of beads and false pearls value Rs 19,47,676. 23,848 cwt of bottles value Rs 2,32,448 and Rs 38,38,867 of other miscellaneous glass ware. The total value of glass imports was thus Rs 69,80,541 in comparison with Rs 49,97,005 in the year 1884-85. The sheet and plate glass are obtained chiefly from Belgium and the United Kingdom, the beads from Italy, Austria, the United Kingdom and France, the bottles almost entirely from the United Kingdom and the miscellaneous glass ware not included under the above headings from the United Kingdom, China, Belgium and Austria. As already remarked the export trade is small amounting in value to from Rs 29,910 in 1884-85 to Rs 41,810 in 1888-89. Of this Rs 36,956 worth was exported by Bombay and Rs 11,262 imported by Aden which appears to be the chief market.

Glazed pottery, see Clay, II 367

GLOCHIDION, Forst. ; Gen Pl III, 272

A genus of evergreen trees or shrubs belonging to the Natural Order EUPHORBACEÆ and comprising about 120 species chiefly natives of tropical Asia. Of these 55 are Indian few are known to be of economic value.

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Bangles
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TRADE
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**GLORIOSA
superba****A Tanning Bark**

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Glochidion lanceolarium, Dalz *Fl Br Ind*, V 308, Wight,
[*Ic t 1905* EUPHORBIACEÆ**Syn** — *PHYLLANTHUS LANCEOLARIUS* Muell NATA Wight *BRADLEIA LANCEOLARIA* Roxb**Vern** — *Bhoma BOMB***References** — Roxb *Fl Ind* 692 Brandis *For Fl* 453 Kurz *For Fl Burm II* 343 Beddome *For Man* 192 Balfour *Cyclop*, I 1212**Habitat** — An evergreen tree from 25 to 30 feet in height found in the forests of North West India from Nepál eastwards to Assam also in Sylhet and Chittagong (*Fl Br Ind*) Beddome states that it occurs in Malabar the Konkán, and South Kanara

TIMBER

Structure of the Wood — Hard and durable employed by the natives of the Bombay Gháts and Eastern India for house building

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G velutinum, Wight, *Fl Br Ind V* 322 Wight *Ic*, t 1907 12**Syn** — *PHYLLANTHUS VELUTINUS* Muell Arg P NEPALENSIS Muell Arg *BRADLEIA OVATA* Wall**Vern** — *Mowa bakalwa* N W P *Pundna kalaon gol kamila samá bera ambli koámil* PB *Kari koria* C P**References** — Brandis *For Fl* 453 Kurz *For Fl Burm II*, 344; Beddome *Forester's Man* 195 Stewart *Pb Pl* 196**Habitat** — A small tree or shrub native of the hot valleys of the Himá laya Burma the Khasia Mountains also the Deccan from the Konkán to the Nilgiri hillsTAN
Bark

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TIMBER

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Tan — The BARK is employed for tanning in the North Western Himá laya**Structure of the Wood** — Brownish white, compact, but soft Used for fuel**GLORIOSA**, Linn *Gen Pl III* 830

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Gloriosa superba, Linn *Baker in Linn Soc Jour*, XVII, 457
[Wight *Ic t 2047* LILIACEÆ**Syn** — *GLORIOSA ANGULATA* Schum METHONICA SUPERBA Lam**Vern** — *Kariari karihari languli kulhari* HIND *Bishalunguli ulat chandal bisha* BENG *Siric samano SANTAL*, *Kurihari* N W P *Mullim kariari* PB *Riyahrar* AJMERE *Nat ka bachhnag* DEC *Karianag* BOMB *Nugkaria indai* MAR *Kalaypakk kishangu kurttikakk kishangu* TAM *Agni skikka kalappa gadda* Adavi nabhi *potti dumpa* TEL *Ventoni mendoni* MALAY *Sima-don Simmi dai hsee mee touk* BURM *Neyangalla* SING *Lángalikká agnisikka kalikari* SANS**References** — Roxb *Fl Ind Ed C B C* 288 Stewart *Pb Pl*, 235 Elliot *Fl Andhr* 11 12 Rev A Campbell *Ec Prod of Chutia Nagpur* No 9497 *Mason Burma and Its People* 429 814 *Pharm Ind* 242 *Moodeen Sheriff Supp Pharm Ind* 147 U C Dutt *Mat Med Hind* 263 307 *Dymock Mat Med W Ind 2nd Ed* 832 S *Arjun Bomb Drugs* 145, *Atkinson Him Dist* 319 738 *Lisboa U Pl Bomb* 270 *Birdwood Bomb Pr* 91 *Balfour Cyclop I* 1212 *Indian Forester II* 27 XII *App* 21 *Home Dept Cor regarding Pharm Ind*, 230 240 240 *Gazetteers* — *Mysore and Coorg I* 67 II, 7 III 18 *Bombay XV* 444 N W P I 85 IV *lxviii***Habitat** — A large scandent herb grasping by the tips of its leaves found in the forests of India Burma and Ceylon ascending to 6,000 feet It produces a large and very handsome flower during the rainsMEDICINE
Root,
244**Medicine** — The ROOT is supposed by Hindu and Muhammadan physicians to have valuable medicinal properties Dutt writes It constituted one of the seven minor poisons of Sanskrit writers and had for

Gloriosa

(J. Murray)

GLORIOSA
superba

one of its synonyms *garbhaghātini* or the drug that causes abortion, but I am not aware of its being used as an abortive for criminal purposes. The tuberous root powdered and reduced to a paste is applied to the navel, suprapubic region and vagina with the object of promoting labour. In retained placenta a paste of the root is applied to the palms and soles while powdered *Nigella* seeds and long pepper are given internally with wine. Early English writers on Indian botany and materia medica speak of it as a violent poison but none furnish satisfactory details of a case in which marked ill effects were produced by its use. It seems highly probable that these ill-effects have been greatly over-estimated, an assumption which is confirmed by experiments recently conducted by **Moodeen Sheriff**. In a special opinion kindly furnished to the Editor he writes: "The root is not so poisonous as is generally supposed. I have taken it myself in small quantities gradually increasing the dose to 15 grains. There were no bad effects but on the contrary my appetite improved and I felt distinctly more active and stronger. I have been using it in my practice during the last sixteen or seventeen years and consider it to be a pretty good tonic and stomachic. Dose from 5 to 12 grains three times daily. In Bombay it is supposed to be an anthelmintic and is accordingly frequently administered to cattle affected by worms. In Madras it is believed to be specific against the bites of poisonous snakes and the stings of scorpions, and is also used as an external application in parasitical affections of the skin." **Surgeon Major Thomson OIE** has kindly furnished the following information regarding its utilisation in Madras:—

There are two varieties of this plant. The root of one plant divides dichotomously that of the other does not divide at all but appears as a single piece shooting into the ground. The former is supposed by the natives to be the male plant the latter the female. The male root is gathered during the flowering season cut up in thin slices and soaked in butter milk to which a little salt is added. In this composition it is soaked by night and dried by day for four or five days. It is eventually dried well and preserved. By this process its poisonous properties are said to be removed. When so prepared and administered by giving a piece or two internally in a case of cobra bite it is said to be an effectual antidote in cobra poisoning. It is called in Tamil *Katharum cheddy*. In scorpion and centipede stings and bites relief is obtained from the pain by applying a paste of the root rubbed up with cold water and then warming the part affected over the fire. This paste is applied also for parasitic affections of the skin.

The STARCH obtained from the root by washing is given internally in gonorrhœa.

Notwithstanding its characteristic appearance the tuber is occasionally employed by natives as an adulterant of the roots of *Aconitum ferox* to which indeed, they believe it to be closely allied in therapeutical properties.

Physical characters and Chemical composition—The root flattened or cylindrical sometimes much pointed at both ends sometimes consisting of two tubers uniting at right angles. On the upper surface may be seen a circular scar marking the point of origin of the stem and on the under surface beneath this another mark to which thin small rootlets are frequently left attached. Covering the tubers is a thin loose and wrinkled epidermis of a brownish gray or pale brown colour, and on removing this skin a brown or dark brown surface is exposed. On cutting the tuber it is found to be dull white and farinaceous internally. The taste is faintly bitter, the odour slightly acrid. A chemical examination by **Dr Warden** resulted in the separation of two resins and a bitter principle *superbine* which the analyst considered closely allied to if not identical with, that of *Scilla maritima* (*Dymock*).

MEDICINE
RootStarch
245CHEMISTRY
246

**GLUTA
tavoyana****Glossocardia, Glossogyne, Gluta****GLOSSOCARDIA, Cass Gen Pl II, 384**

247

Glossocardia linearifolia, Cass Fl Br Ind, III 308 Wight
[*It 1110 COMPOSITÆ*]**Syn** —GLOSSOCARDIA BOSVALLIA DC VERBESINA BOSVALLIA, Linn f
V BOSWELLIA Roxb PECTIS MEIFOLIA Wall**Vern** —Seri HIND *lithapra phatursuva* BOMB *Pitta-pápada* POONA
Pathara suva MAR *Paripalanam* TEL *Pithuri* SANS**References** —Roxb *Fl Ind*, Ed C B C 607 *Dals & Gibs Bomb Fl*
129 *Dymock Mat Med W Ind 2nd Ed* 433 *Lisboa U Pl Bomb*
200 *Gazetteers* —Bomb XV 436 *Mysore and Coorg I* 56 N W P
I 82**Habitat** —A branched glabrous annual herb native of Rohilkhand
Banda Central India and the DeccanMEDICINE
248**Medicine** —Dymock states that this plant is employed medicinally by
the druggists of Poona and Dalzell and Gibson mention that it is much
used in female complaints the nature of which however they do not
specifyFOOD
Leaf
249**Food** —Lisboa includes this in his list of Famine Plants and writes
The LEAF is said to be eaten in ordinary years as a vegetable, and is be-
lieved to be perfectly wholesome**GLOSSOGYNE, Cass Gen Pl II 288 [POSITÆ**

250

Glossogyne pinnatifida, DC, Fl Br Ind III, 310 COM**Syn** —BIDENS RIGIDA Hort Calc ZINNIA BIDENS Retz BIDENS PIN-
NATIFIDA Heyne**Vern** —Barangom bir barangom SANTAL**References** —Roxb *Fl Ind Ed C B C* 604 *Dals & Gibs Bomb Fl*
129 *Rev A Campbell Ec Prod Chutia Nagpur Nos* 17541 8424 N
W P *Gazetteer I* 82 IV lxxiii**Habitat** —A perennial glabrous herb of the plains of India from Jammu
and Garhwal to Western Bengal and Behar and southwards to MadrasMEDICINE
Root
251**Medicine** —The Rev A Campbell states that a preparation from the
ROOT is employed by the Santals as an application to snake-bite and scor-
pion sting**GLUTA, Linn Gen Pl, I, 421**

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Gluta elegans, Wall Fl Br Ind II, 22 ANACARDIACEÆ**Vern** —Thayet thitsé khye BURM**References** —Kurs *For Fl Burm I* 310 *Prelim For Rep on Pegu*
App A xli, Gazetteer Burma I 136**Habitat** —A small evergreen tree found along the coast of TenasserimDYE
Wood
253**Dye** —Kurz mentions that the WOOD is used in Burma for dyeing yield-
ing with different mordants various shades of colour from orange to black
In the *Burma Gazetteer* the colours obtained are described as followsWith—1 muriate of tin—three shades of orange varying with the tem-
perature of the bath and the time of immersion 2 acetate of alumina—
two shades of flame colour, 3 acetate of iron—two shades of drab
4 acetate of iron, with a weak solution of galls—a fine black of two
shadesTIMBER
254**Structure of the Wood** —Good for furniture and when steeped in
ferruginous mud turns jet black looking like ebony Used also for build-
ing purposes boxes &c (Kurz)

255

G tavoyana, Wall, Fl Br Ind II, 22**Vern** —Thayet thitsé BURM Ohay thumay KAREN**References** —Kurs *For Fl Burm I* 309 *Conference on Timbers Cal*
& Ind Exhib July 26th 1886 p 2

Gluta, The Manna Grass, Soy Bean	(J Murray)	GLYCINE
Habitat — A small evergreen tree of the coast of Tenasserim from Tavoy southwards		
Structure of the Wood — Heart wood bright dark red, close-grained, not so mottled with dark and light streaks as that of <i>G travancorica</i> . When seasoned it floats and is very durable though brittle. Specimens of the wood of this species and of <i>G travancorica</i> were shown at the Conference on timbers held in connection with the Colonial and Indian Exhibition of 1886 but neither appears to have attracted favourable attention though their merits were urged by the Indian officials present		TIMBER 256
Gluta travancorica , <i>Beddome Fl Br Ind II, 22</i>		257
Vern — <i>Shen kurani shen curungi</i> TINNEVELLY		
References — <i>Beddome Fl Sylv t 60 Gamble Man Timb 109 Indian Forester III 22 23</i>		
Habitat — A large evergreen tree abundant in the dense moist forests of the Tinnevely and Travancore Ghats		
Structure of the Wood — Sapwood light reddish grey heartwood dark red very hard and close grained beautifully mottled with dark and light streaks. Weight 40lb (<i>Beddome</i>) 46 to 58lb (<i>Gamble</i>) per cubic foot. Gamble remarks. This wood is little used but its splendid colour and markings should bring it to notice as a valuable wood for furniture. It seems to season well and works and polishes admirably		TIMBER 258
Gluten of wheat , see <i>Triticum sativum</i> Lam GRAMINEÆ		
GLYCERIA , <i>R Br Gen Pl III 1197</i>		
Glyceria fluitans , <i>R Br Duthie Indigenous Fodder Grasses of the Plains of the N W P 41</i> GRAMINEÆ		259
MANNA GRASS		
Syn — <i>FESTUCA FLUITANS</i> Inn. <i>POA FLUITANS</i> Scop		
References — <i>Ba on Ferd von Mueller Select Extra tropical Plants 324 Trans Agri Hort Soc of India VIII 98 Smith Dic 265</i>		
Habitat — A perennial grass with tender foliage met with in the Baspa Valley and Pangi. It delights in stagnant water ditches pools ponds and slow flowing streams covering their surface		
Food and Fodder — The FOLIAGE is sweet tender and much liked by cattle. The SEEDS are used for food in many countries being cooked as a sort of porridge		FOOD and FODDER Foliage 260 Seeds 261 262
GLYCINE , <i>Inn Gen Pl I, 530</i>		
A genus of twining or sub erect herbs belonging to the Natural Order LEGUMINOSÆ and comprising about 12 species distributed throughout the tropics of the Old World especially Australia. Of these two are natives of India and a third extensively cultivated. It has been customary to speak of the Soy Bean of India as <i>Glycine Soja</i> . <i>Maximowicz</i> accepts <i>G Soja</i> Sieb et Zucc as the wild form of the plant (<i>G ussuriensis</i> Regel et Maack) — a native of Japan and China and reduces the cultivated state to a variety (= <i>Soja hispida</i> , <i>Mench Dolichos hispida</i> Thbg.) <i>Forbes and Hemsley</i> in their enumeration of Chinese plants (<i>Journ Lin Soc Vol XXII 188</i>) accept these two forms as species under the names and synonyms given above. The cultivated plant differs chiefly from the wild in its greater degree of hairiness, more erect stem and larger legumes. Reference having been made to the authorities of the Calcutta Herbarium on the subject of <i>G Soja</i> Sieb et Zucc being as shown in the <i>Flora of British India</i> a native of this country <i>Dr Prain</i> kindly went into the subject very carefully. He writes "We have not from any part of India any specimens of <i>G Soja</i> proper. The Khasia hill plant is more erect more hispid and has larger legumes than the Himalayan and indeed resembles		

GLYCINE
hispida.

The Soy Bean

G hispida, *Maxim* quite as much as it does the Indian cultivated "**G Soja**," which indeed it connects with **G hispida**. It is in fact the plant most like the wild **G Soja**, *S et Z* which no one ever professes to have found wild in India while it is also the one most like **G hispida**, *Maxim* (which has never been found wild anywhere). It is the plant collected by Dr Watt and myself in the Naga hills.

The writer noted on his Naga hill specimens that they were found in a semi wild state and that the plant was known to the Angami Nagas as *Tsu Dsa* a name not unlike **Soja**. Throughout India the Soy Bean is cultivated black and white seeded forms being met with which vary to some extent but all preserve the specific characters of **G hispida**. Plants raised at Saharanpur from Japanese seed have larger and broader leaves than the usual Indian forms. The fact that this cultivated plant possesses even among the aboriginal tribes names which are original *ie* in no way modern derivatives points to an ancient cultivation if indeed it may not be accepted as an indication of its indigenous nature (*Fodor*).

[et Zucc. LEGUMINOSÆ

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Glycine hispida, *Maxim* Fl Br Ind II, 184 under **G Soja Sieb**

THE SOY BEAN

Syn —**DOLICHOS SOJA** Linn **SOJA HISPIDA** Moench **S ANGUSTIFOLIA** Miq

Vern —**Bhat bhatwan ram kurthi** HIND **Bhut PUNJ** Gari kulay BENG *Hendedisom horec* (black seeded) *Pond disom horec* (white seeded variety) **SANTAL Tsu dsa** NAGA **Bhatnas bhatwas** NEPAL *Seta kala botmas* PARBAT *Musa gya* NEWAR *Khajuwaa* EASTERN TERAJ *Bhut* KUMAUN

References —*Roxb Fl Ind Fd* C B C 563 *Stewart Pb Pl* 76 *DC Origin Cult Pl* 330 *Campbell Fc Prod Chutia Nagpur* Nos 8156 8158 *Atkinson Him Dist* 309 606 *Buchanan Hamilton Acct of Nepal* 228 *Church Food Grains of India* 140 *Spons Encyclop* 1378 1814 *Smith, Dic* 386, *Kew Reports* 1882 42 *Kew Off Guide to the Mus of Ec Bot* 43 *Trop Agri I* 567 *IV* 695 *Agri Rep Assam* 1882-83 No 37 *Special Reports Director Land Rev and Agri Bengal Rep of Proc of Rev and Agri Dept* 1882 2 to 12 1883 1 to 7

Habitat —Extensively cultivated throughout India and in Eastern Bengal Khásia hills Manipur the Naga hills and Burma often found as a weed on fields or near cultivation

Oil —Large quantities of the SEED are annually used by the Chinese in the manufacture of an edible oil. It is said that they obtain 17 per cent of oil by simple pressure. It bears a general resemblance to the ordinary edible oils of commerce, possessing an agreeable flavour and odour. It is useful for burning exposed to a low temperature it becomes pasty and oxidizes rapidly on exposure to the air. As a drying oil it might replace linseed for some purposes. As an illuminator it is being rapidly replaced by American petroleum but is still extensively used for food. It is an important article of Chinese commerce (*Spons' Encyclo pædia* 1378).

Medicine —A decoction of the ROOT is said to possess astringent properties.

Food and Fodder —The Soy bean forms an important article of food in China and Japan. Since 1873 it has been successfully grown in the warmer parts of Europe. It is also widely spread in a cultivated state over a great part of the Himalaya and the plains and lower hills of India. On the plains the crop is generally grown by itself as a *kharif* crop the seeds are sown from June to September and the harvesting takes place from November to January. Church gives the following information regarding the best methods of cultivation. The seeds should be placed at a depth not

OIL
Seed
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The Soy Bean

(F Murray)

GLYCINE
hispidaFOOD and
FODDER

Cultivation

Area

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Chemistry
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Bean

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Oil
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exceeding 1 to 1½ inch 18 plants may be left after weeding to the square yard. A peaty soil or one rich in organic matter suits the plant best. A calcareous soil is also favourable to its growth. Sulphate of potash is a good manure. Nitrogen may be supplied either as nitrate of soda or in the case of soils poor in organic matter in the form of rape or mustard cake but it is rarely needed while large applications of nitrogenous manure exert a distinctly injurious effect upon the yield of beans. So far as we know this very important vigorous and productive pulse is not attacked by any insect or parasitic fungus. Two chief varieties of the cultivated Soy occur in India one called white the other black but they are not distinguished by definite characters in chemical composition nor in properties.

Precise information cannot be given regarding the area under this crop in the various provinces of India. Attempts have been made by Government to extend its cultivation in Assam but apparently without success. In 1882 Professor Kinch urged the advisability of renewed efforts in the Himalayan tracts and as a consequence the Government of India directed the attention of local officials to the subject. Seed obtained from the Government Gardens Saharnpur were distributed to Madras the Panjáb Bengal Bombay Hyderabad and Burma for experimental cultivation. It appears to have been grown from seed obtained from China with a fair amount of success at the Saidapet Experimental Farm in 1882.

CHEMISTRY—The chemical composition of the bean according to Professor Kinch places it above all other pulses as an albuminous food while that of the straw also surpasses in nitrogenous value that of wheat lentils and even hay. The following composition is given by Professor Church. In 100 parts of the bean water 11 albumenoids 35.3, starch and sugar 26, fat 18.9, fibre 4.2, ash 4.6. The nutrient ratio is here about 1 : 2 while the nutrient value is 105.

The BEAN is eaten in India in the localities where cultivated. The Rev A Campbell states that in Chutia Nagpur it is generally used roasted and ground as *satu* or simply roasted in the form of *atá*. In other parts of the country it is also eaten in the form of *dal*. In China and Japan three preparations are made from the soy bean namely soy sauce soy cheese and a kind of paste the two last of which are manufactured by crushing and pressing the seeds. The following description of the composition and preparation of the sauce is given in *Spons Encyclopaedia*—This useful condiment said to form the basis of almost all the popular sauces made in Europe is prepared by the Chinese and Japanese by boiling the beans with an equal quantity of roughly ground barley or wheat and leaving it covered for 24 hours to ferment. Salt is then added in quantity equal to the other ingredients. Water is poured over and the whole is stirred at least once daily for two months when the liquid is poured and squeezed off filtered and preserved in wooden vessels becoming brighter and clearer by long keeping. Its approximate value in the London market is 2s 3d to 3s a gallon for Chinese and 2s 4d to 2s 5d for Japanese. It is not specified in the trade returns but doubtless forms the chief item of the unenumerated species imported from China. As already mentioned the OIL is extensively used in China and Japan as an article of food and the cake left after the expression of the oil is also eaten by the poorer classes.

The soy bean is an extremely valuable fodder plant. If cut just when the pods are fully formed it makes most nutritious hay and the residual cake above mentioned which contains, according to Church 40 per cent of flesh forming materials and 7 per cent of oil is an extremely rich cattle-food.

GLYCYRRHIZA
glabra

Glycosmis Liquorice

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GLYCOSMIS, *Correa* Gen Pl, I 303
Glycosmis pentaphylla, *Correa* Fl Br Ind, I 499 **RUTACEÆ****Syn**—GLYCOSMIS CHYLOCARPA W & A G ARBOREA DC G RETZII
Roem LIMONIA PENTAPHYLLA *Retz* L ARBOREA *Roxb* ; MYXOSPER
MUM CHYLOCARPUM *Roem***Vern**—*Ban nimb*u potali pilrupotala gurgitti ban nimb *HIND* Ash
shoura *BENG* Kirmira *BOMB* Kirmira menki *GOA* Gonji pandu
golugu konda golugu *TEL* Guroda *KAN* Tanshouk *BURM***References**—*Roxb* Fl Ind Fd C B C 364, *Kurs* For Fl *Burm* I
185 186, *Beddome* Fl Sylu Anal Gen XLIII t 6 66 *Bedd* in *Trans*
Linn Soc XXV 211 *Gamble* Man Timb 59 *Thwaites*, Fn *Ceylon*
Pl 45 406, *Dals & Gibs* Bomb Fl 29 *Elliot* Fl Andhr 61 95
Atkinson Him Dist 307 *Lisboa* U Pl Bomb 149 274 *Atkinson*
Ec Prod of N W P Pt V 49, *Indian Forester* X 315 325 XIV
390 *Gazetteers*—*Mysore and Coorg* I 69 *N W P* IV lxix
Bomb XV Pt I 429**Habitat**—A common evergreen shrub throughout the Tropical and
Sub tropical Hímálaya ascending to 7 000 feet in Sikkim It extends
from the Sutlej river in the North West eastwards and southwards to
Upper Assam Burma Travancore Malacca and Ceylon**Medicine**—*Mr T N Mukharji* states that the roots pounded and
mixed with sugar are given in cases of low fever by Native practitioners
Lisboa mentions that the wood bruised with water is administered inter
nally as an antidote for snake bite**Food**—The FRUIT a white berry about the size of a large pea is
commonly eaten**Structure of the Wood**—White hard close grained**Domestic Uses**—Twigs used by the Bengalis to clean the teeth The
LEAFY TWIGS are in some of the rural parts of Bengal stuck into the
walls and roofs of huts about the beginning of April to ward off lightning
(see also *Euphorbia antiquorum* p 295)**MEDICINE**

Roots

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FOOD

Fruit

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Leafy twigs

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GLYCYRRHIZA, *Linn* Gen Pl I 508**Glycyrrhiza glabra**, *Boiss* Fl Or II, 202 *Linn* **LEGUMINOSÆ****LIQUORICE ROOT****Vern**—*Mulhatti jethi madh* extract=*jathimadh ka ras mulatthi ka ras*
HIND *Yashtimadhu jai shbomodhu* *BENG* *Muratti ka jur* *BEHAR*;
Mulethi *N W P* *Mitthi lakri* *DEC* *Bazar root*=*aslasus jetimadh*
mulethi extract=*rabesus* *PB* *Zaisi makh sus* *AFG* *Yashti madhu*
HOMB *Jeshti madha* *MAR* *Jethi madha* *GUZ* *Anti ma duram*
ati maduram extract=*ati maduram-pul* *TAM* *Yashti madhukam* *ati*
madhuramu extract=*yashti maduram-pulu* *TEL* *Yashti madhuká*
ati madhura *KAN* ; *Yashti madhukam* *ati madhuram* *vatti madhu*
ram *MALAY* *Noe khuyu noe khuyu asur* *BURM* *Ati maduram velmi*
SING *Madhuka yashti madhu madhu yashtikam* *SANS* *Aslussus*
extract=*rubbussus* *ARAB* *Bikhe mahak* extract=*asus rob a sus ausa*
rahe mahak *PRS***References**—*Stewart* Pb Pl 69 *Aitchison* Botany of Afgh Del Comm
56 *Mason's* Burma and Its People 502 *Pharm Ind* 75 *Ainslie*, *Mat*
Ind I 199 *O'Shaughnessy*, *Beng Dispens* 293 *Moodeen* *Sneriff*
Supp Pharm Ind 148 *U C Dutt* *Mat Med Hind* 143 324 *Dy*
mock *Mat Med W Ind* 2nd Fd 244 *Fleming* *Med Pl and Drugs*
as in *As Res* Vol XI I 168 *Fluck & Hanb* *Pharmacog* 179,
Bent & Trim *Med Pl* 74 *S Arjun* *Bomb Drugs* 41 *Murray* *Pl*
and Drugs *Sind* 117 *Med Top Ajmir* 146 *Irvine* *Mat Med Patna*
64 *Baden Powell* *Pb* 1 r 340 *Birdwood* *Bomb* *Pr* 29; *Buck* *Dyes*
and Tans *N W P* 44, *Liottard* *Dyes* 136 *Smith* *Dic* 247 *Kew*
Off Guide to the Mus of Ec Bot 41 *Report on the Settlement of the*
Hardoi District *Oude* 15 *Indian Forester* XIII 93

Liquorice Root

(J. Murray)

GLYCYRRHIZA
glabra.

Habitat—A perennial herb of South Europe Asia Minor Armenia Siberia Persia Turkistan and Afghanistan. It is cultivated in Italy France Russia Germany Spain and China also to a small extent in England. Though neither wild nor cultivated in India it is an import of some consequence and has been employed for medicine and in dyeing for many years. The root used in medicine is principally derived from two varieties namely—*α typica* and *γ glandulifera* (Boissier).

Dye—The wood imported through the Panjáb from Afghanistan is in the North West Provinces employed in calico printing to perfume the fabric and give it a finish (Sir E. C. Buch).

Medicine—Liquorice root has been used in Hindu medicine from a very remote period. U. C. Dutt states that it is mentioned by Susruta and is described as sweet demulcent cooling and useful in inflammatory infections cough hoarseness thirst &c. It is much employed for flavouring medicinal decoctions oils and *ghritas* and enters into the composition of numerous external cooling applications along with red sandal wood madder *Andropogon muricatus* &c. The drug also possesses a wide reputation in the works of Arabic and Persian physicians. Thus Dymock writes: "The author of the *Makhzan ul Aduya* gives a lengthy description of the plant and directs the root to be decocted before it is used. He says that the Egyptian is the best next that of Irak and then Syrian. The root is considered hot dry suppurative demulcent and lenitive relieving thirst and cough and removing unhealthy humours also diuretic and emmenagogue useful in asthma and irritable conditions of the bronchial passages. Sheik el Rais recommends the decoction in cold colic it is also dropped into the eyes to strengthen the sight. A poultice made of the LEAVES is said to be a cure for scald head and stinking of the feet or arm pits. Muhammad bin Ahmad and Yohanna bin Serapion recommend the SEEDS as being the most active part of the plant but remark that they are only produced in certain climates (eg Basra). In Europe also the medicinal value of Liquorice has long been known. It is unquestionably alluded to by Theophrastus and by Dioscorides who calls the plant *γλυκυρριζή* also by several Roman writers (Cæsus Scribonius Largus and others) who describe it under the name of *RADIX DULCIS*. It appears to have originally enjoyed a reputation chiefly as a demulcent and sedative in diseases of the respiratory tract."

Characters and Chemical Composition—The root occurs in long cylindrical branched pieces an inch or less in diameter tough and pliable externally of a greyish brown colour yellow internally with a somewhat disagreeable earthy odour and a sweet mucilaginous somewhat acid taste (*Indian Pharm.*). Flückiger and Hanbury describe it as containing in addition to sugar and albuminous matter a peculiar sweet substance named *Glycyrrhin* in which is precipitated from a strong decoction by the addition of an acid or a solution of cream of tartar or by neutral or basic acetate of lead. When washed with dilute alcohol and dried *Glycyrrhin* is found to be an amorphous yellow powder with a strong bitter sweet taste and an acid reaction. With hot water it forms a solution which gelatinizes on cooling does not reduce alkaline tartrate of copper is not fermentable and does not rotate the plane of polarization. Gorup Besanetz (1876) found its composition to be represented by the formula $C_{16}H_{24}O_6$. By boiling with a dilute mineral acid a resinous amorphous bitter substance named *Glycyrrhetin* the composition of which is undetermined and an uncrystallizable sugar are obtained. Other chemists have found asparagin and malic acid in the root and the presence of starch and a small amount of tannin in the outer layers is easily demonstrated.

Action and Uses—Liquorice and its preparations are in European

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Uses
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**GMELINA
arbores.****Liquorice, Gmelina****MEDICINE**

medicine, chiefly used for pharmaceutical purposes. It disguises the taste of many nauseous drugs, particularly senna aloes chloride of ammonium, senega, hyoscyamus turpentine and bitter sulphates and is also when powdered a useful basis for pills. It has a pleasant taste and, when slowly chewed or sucked, increases the flow of saliva and mucus. It is also a popular demulcent and is largely employed to relieve sore throats and coughs. It is used by Native practitioners as a demulcent in catarrh of the genito-urinary passages and as a slight laxative.

**TIMBER
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Structure of the Wood—Bright yellow tough and fibrous. Dymock writes: 'In Persia glass bottle-makers use the wood for melting their materials, as they say it gives a greater heat than any other kind of fuel.'

**TRADE
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Trade—The chief supply of the root in India is obtained from the Persian Gulf and Karáchi and of the wood for dyeing from Afghánistan via the Panjáb. Dymock states that the kind known as Karáchi liquorice is the best and fetches from Rs 30 to 80 per kandy of 5 cwt. Ordinary Persian liquorice is smaller and not so sweet.

GMELINA, Linn ; Gen Pl, II, 1153

A genus of trees or shrubs belonging to the Natural Order VERBENACEÆ, and comprising eight species of which five are natives of India.

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Gmelina arborea, Linn, Fl Br Ind, IV, 581, Wight, Ic t 1470 ;
[VERBENACEÆ]

Syn—GMELINA RHEEDII Hook ; PREMNA ARBOREA Roth P TOMENTOSA Miq

Vern—Kumbhár gumbhar gamhar gambhár khammara, kambhar kumar gambari, sewan shewan gamari khambhári HIND ; Gamari gumur, gumbar, BENG ; Gambari URIYA Gumbher kasamar KOL ; Kasmar SANTAL ; Gomari ASSAM ; Gambari NEPAL ; Numbon LEPCHA ; Gumai CACHAR ; Bolko bak GARO ; Kurse GOND ; Kumbhár Gumbhár Bazar fruit=kakódumbhári PB ; Sewan HAZARA ; Kassamar KURKU ; Gumbhar shiwun C P ; Shewun BOMB ; Shewan, shiwan MAR ; Chimman sag BHIL ; Gumudu téku taggummadu kasmariyamu gu madu cummi TAM ; Gumar tek pedda gomru tagumuda gumudu, pedda gumudu téku gumudu téku TEL ; Kasmiri kuli shewney shi vani KAN ; Kumbulu MALAY ; Ramani MAGH ; Yamanai yomené kywobc kywon pho BURM ; At demmata SING ; Gumbhari srinpari Kasmari SANS

References—Roxb Fl Ind Ed C B C 486 Brandis For Fl 364 ; Kurr For Fl Burm II 264 Beddome Fl Sylv, t 253, Gamble Man Timb 295 Thwaites En Ceylon Pl, 244 Dals & Gibs Bomb Fl 201 Stewart Pb Pl 166 Elliot Fl Andhr 65 88 148 174 Mason Burma and Its People, 526 793 Rev A Campbell Ec Prod Chutia Nagpur, No 9245 O Shaughnessy Beng Dispens 486 U C Dutt Mat Med Hind 218, 297 304 Dymock Mat Med W Ind 2nd Ed 599 S Arjun Bomb Drugs 105 Baden Powell Pb Pr 365 581 Atkinson Him Dist 315 738 Drury U Pl 228 Lisboa U Pl Bomb 107 168 Birdwood Bomb Pr 334 Balfour Cyclop I 213 Treasury of Bot I 538 Aplin Rep on Shan States 1887-88, For Adm Rep Chutia Nagpur 1885 6, 33 Buchanan Statistics of Dinajpur 151 Agri Hort Soc of India Journals (Old Series) VI 26 VIII Sel 177 IX 252 Sel, 44 XIII 307 (New Series) VII 276 Indian Forester II 19 23 V 190 VI, 101 VIII 127 128 414, 438 IX 238 359 607 X 222 325 XI 354 XII App 19, XIII, 121 Gasetteers—Mysore and Coorg I 48 Rajputana 25, N W P IV Lxviii Bombay VI 14 VII 32 36 XIII 27 XV 70 XVII 26 XVIII 52 Orissa II 179 App VI Settlement Reports—Central Provs—Raipore District, 75 Chanda, App VI Manual of the Combarore District (Madras) 407

Habitat.—A large deciduous tree, sometimes attaining the height of 60 feet, met with in the Sub-Himálayan tract from the Chenab eastwards, also throughout India, Burma, and the Andaman Islands Mr O B Clarke,

A Timber very suitable for Canal Locks, &c (J Murray)

GMELINA
arborea

in the *Flora of British India* describes a variety—*glaucescens*,—which differs from the type species in having its leaves glaucous beneath, often nearly glabrous in the mature state. It is a native of the Sub-tropical Himalaya and the Khásia Mountains at altitudes up to 2 000 feet.

Dye—The Rev A Campbell states that the WOOD-ASHES and FRUIT are employed as dyes by the Santals. This fact is of interest as the writer can find no reference to their being similarly utilised in other parts of India.

Medicine—The root has long been an article of medicine with the Hindus. It is described as bitter tonic stomachic laxative and useful in fever indigestion anasarca and various other complaints. U O Dutt writes: It is an ingredient of *dasamula* (a compound decoction of ten plants,—*Desmodium gangeticum*, *Tribulus terrestris*, and others) and is thus much used in a variety of diseases. Bangasena says that *gambhári* root, taken with liquorice honey and sugar increases the secretion of the milk. The FRUIT is sweetish bitter and cooling and enters into the composition of several refrigerant decoctions for fever and bilious affections. The Kanára Gazetteer contains the information that the root fruit and BARK are all used medicinally in that district, and Dymock states that in Bombay the juice of the young LEAVES is used as a demulcent in gonorrhœa cough &c. either alone or combined with other drugs of similar properties. In other parts of India the root and fruit appear to be the parts generally employed medicinally and in Northern India, the former is believed to have anthelmintic properties.

Food and Fodder—This species flowers in the beginning of the hot season and produces a FRUIT in April and May which is eaten by the Gonds and other hill tribes. The LEAVES are used as fodder, and are also much browsed by deer and other wild animals.

Structure of the Wood—Yellowish greyish or reddish white with a glossy lustre close and even grained soft strong does not warp or crack in seasoning weight from 28 to 35 lb per cubic foot breaking weight of a bar 6 feet × 2 inch × 2 inch 580 lb (according to Baker). It is light has a good surface is very durable is easily worked, and takes paint and varnish readily and is therefore highly esteemed for planking furniture carriages boat decks panelling and ornamental work of all kinds (*Gamble*). Mason states that it is largely employed by the Karens for canoes and by the Burmans for clogs. Owing to its extreme durability it has been recommended as an excellent timber for making tea boxes and has also attracted much attention as a very suitable wood for furniture, picture-frames and similar work in which shrinking and warping have to be avoided. Buchanan states in his Statistics of Dinajpur that 'it is much employed by the natives for making their instruments of music'. The excellence of this timber for many purposes appears to have been first noticed and described by Roxburgh who subjected it to various experiments which he describes as follows. One of the experiments and the most interesting was made by placing part of an outside plank in the river a little above low water mark exactly where the worm is thought to exert its greatest powers. After remaining three years in this situation though examined from time to time the piece was cut with the view of carrying a specimen of it to England and to my great joy I found it as sound and in every way as perfect throughout as it was when first put into the river. Amongst other things a valuable flood door was made of it to keep the tides out of the Botanic Garden. It is now seven years and a half since the door (which is 4 feet square) was made, and though much exposed to the sun and water yet it remains good while similar doors though much smaller, made of teak, were so much decayed a year ago, as

DYE
Wood-Ashes 288
Fruit 280
MEDICINE
Root 290

Fruit. 291
Bark 292
Leaves. 293

FOOD
Fruit 294
FODDER
Leaves 295
TIMBER.
296

GMELINA
asiatica.
The Asiatic Gmelina.
INDUSTRIAL
USE
297

to render it necessary to replace them' Since the date of the publication of the above experiments the wood has come permanently into notice and is in considerable demand in Calcutta for furniture-making

Industrial Use—The tree has been recommended as a good one on which to rear silkworms (*Agri Hort Soc of India Journ*, *II* (New Series) 276)

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Gmelina asiatica, Linn, *Fl Br Ind*, *IV*, 582, *Wight, Ic*, t 174

Syn—*GMELINA COROMANDELIANA* Burm G LOBATA Gaertn *Fruct I* 268 t 56, excl syn Rumph G PARVIFOLIA Roxb G PARVI FLORA Roxb C INERMIS Blanco MICHELIA SPINOSA Amman

Vern—*Badhára* HIND *Bhedaira* BEHAR, *Badhára* PB *Lahn shivan* MAR *Nalak kumish*, TAM; *Gumudu*, *gumudu challa gumudu karva gumudu* TEL *Lahn shivan kal shivan* KAN *Nalak kumash* MALAY *Gatta-demmatta* SING; *Biddari* SANS

References—Roxb *Fl Ind Ed C B C* 487 *Brandis For Fl* 365 *Kurs For Fl Burm II* 265, *Beddome For Man* 172, *Elliot Flora Andhrica* 33 65 89 *Pharm Ind* 164 *Ainslie Mat Ind II* 240 386; *O Shaughnessy Beng Dispens* 486 *Dymock Mat Med W Ind 2nd Ed* 599, *S Arjun Bomb Drugs* 199, *Irvine Mat Med Patna* 124 *Baden Powell Pb Pr* 364 *Drury U Pl* 229 *Balfour Cyclop I* 1214 *Treasury of Bot I* 538 *Official Corresp on proposed new Pharm Ind* 240-1 *Gazetteers—Mysore and Coorg I* 64 *Bombay XV*, 70 *N W P Vol I* 83 *IV Lxxvi*

Habitat—A large much branching shrub of the forests of South India Burma and Ceylon cultivated in Bengal

MEDICINE
Root
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Medicine—The root has been used as a demulcent by Hindu physicians from remote times Rumphius mentions it under the name of *jambusa sylvestris parviflora* "Louriero speaks of its virtues in his *Flora of Cochinchina* commending it as of value in rheumatism and affections of the nerves Dr Horsfield in his *Account of the Medicinal Plants of Java* states that the plant was formerly in high esteem amongst the Portuguese who called it *Rais Madre de Deos* Ainslie also notices the plant writing "The root which as it appears in the bazárs is mucilaginous and demulcent the Vytians reckon amongst those medicines which purify the blood in cases of depraved habit of body given in the form of electuary to the quantity of a tea spoonful twice daily In another passage he describes the virtues of the LEAVES as follows 'Its leaves would appear to have the quality of thickening water and rendering it mucilaginous when agitated in it so becoming a useful drink in gonorrhœa and other maladies requiring demulcents. Certain other leaves have the same property, with this difference that when our article is gently stirred in water and the leaves at the same time a little bruised the thickening of the water, by this means produced does not pass away as in the other instances but remains so it must be considered as a much more valuable medicine.' Roxburgh and O Shaughnessy comment on the same property of the leaves and their observations are republished in the *Pharmacopœia of India*, which includes the drug in its non-official list At the present time the root is principally employed as a demulcent for gonorrhœa and catarrh of the bladder in doses of ʒii to ʒiii in infusion but it is also supposed to possess specific properties in the treatment of rheumatism and syphilis.

SPECIAL OPINIONS—§ Laxative and alterative Useful in chronic rheumatism" (*Surgeon Major F McD Houston Travancore, and John Gomes Esq, Medical Store keeper, Trivandrum*) Useful in chronic rheumatism" (*Surgeon Major F F L Rutton, M D, Medical College, Madras*)

DOMESTICS

Domestic—The Telugu names above given are said by Elliot to be

Gneiss Rocks.	(J Murray)	GNEISS
derived from the fact that churning sticks are made from the SHRUB — <i>Challa</i> means butter milk and <i>Kavammu</i> a churning-stick		DOMESTIC Shrub 301
GNAPHALIUM , Linn , Gen Pl, II 305		
Gnaphalium luteo album , Linn , Fl Br Ind, III 288		302
[COMPOSITÆ		
Syn — GNAPHALIUM ORIXENSE and G ALBO LUTEUM Roxb SYNAN <i>THERA Wall, Cat 7415</i>		
Var 1 — MULTICEPS heads golden yellow G MULTICEPS Wall G RAMIGERUM and CONFUSUM DC G AFFINE Don G MARTABANICUM <i>Wall</i>		
Var 2 — PALLIDUM heads pale brown G PALLIDUM Ham		
Vern — <i>Bál raksha</i> PB <i>Byaing che pin</i> BURM		
References — <i>Roxb Fl Ind Ed C B C 600 601 Kura Prelim For</i> <i>Rep on Pegu App C xii Stewart Pb Pl 127 Gazetteer N W P</i> <i>IV lxxiii</i>		
Habitat — A very variable annual common throughout India from Kashmir to Burma and southwards to Martaban ascending to 10 000 feet in Sikkim Var 1 multiceps is the rarer Indian form seldom occurring on the plains but fairly plentiful on the Sub-tropical and Tropical Himálaya and the Khásia Mountains Var 2 pallidum , is very common all over the country		
Medicine — Stewart states that the LEAVES are sold as a medicine in the bazárs of the Panjáb and quotes Madden to the effect that another unknown species is employed for tinder and moxas in the region of the Sutlej		MEDICINE Leaves 303 Tinder 304
Domestic — In Assam and the Naga Hills the leaves are rubbed in the hand to crumble away the cellular tissue leaving behind the tomentum This constitutes the tinder universally used on the eastern side of India		DOMESTIC 305
GNEISS , Ball, <i>Geology of India III, 534</i>		306
The following note has been kindly furnished by Mr H Medlicott late Director of the Geological Survey		
Gneiss, Eng		
GNEISS GRANITE, Fr GNEISS HOLZ GNEISS, GRANIT Ger GRANITO It		
With the exception of a few comparatively small tracts of overlying strata gneissic rocks extend east of a line from Rotashgarh on the Son through Amarkantak to Goe, without a break from Cape Comorin to Colgong on the Ganges at the north east corner of the peninsula a distance of 1,400 miles with a mean breadth of 350 miles A continuation of this great exposure is found again in Assam and the Shillong plateau where it also covers a considerable area, 250 miles in length between the Dhansiri and Brahmaputra rivers In Bundelkhand there is a large compact semi circular area of gneiss In the north west quarter of Peninsular India in the Arvali region another area of gneiss occurs In the Lower Himálayas, gneiss occurs over a considerable area in Sikkim in the neighbourhood of Darjiling, and more or less throughout the whole range to the Sutlej		
In the Himálayan Range proper gneiss is the predominant rock for 300 miles to the west of Nepál many of the highest peaks being formed of it In Ladák a range of syenitic gneiss separates the Indus from its tributary the Shaiok and the Pang kong lake and passes to the south east on both sides of the Indus through Rupshu into Chinese Thibet The Zánkár range in its central portion and the Pir Panjál chain consist		Building Stones 307
G 307		

GNETUM scandens**A Fibre used for making Fishing Nets****GNEISS**

to a great extent of this rock. Another gneissic ridge is the Dhauladhar range extending north of the Kangra Valley in a north west direction as far as Dalhousie.

In Burma the gneissic series consists to some extent of granitoid and hornblende gneiss. Little attention has hitherto been paid to the metamorphic rocks of Burma; they occupy a large but unexplored area in Upper Burma; they form all the higher ranges in the neighbourhood of Ava and extend throughout a great portion of the country extending thence to Salwin. Further north they reach from Bhamo to the neighbourhood of Momein in Yunnan; the crystalline rocks then continue to the south forming the Red Karen country and the hills between Sittang and Salwin and extend into Tenasserim.

In the Nilgiri hills there are several places where excellent building stones could be obtained but hitherto not much use has been made of them. In Mysore a variety is obtained which can be split into posts 20 feet long which are used as supports for the telegraph wires. In the construction of walls, bunds of tanks, the beach groynes at Tranquebar, culverts, temples, bridges &c blocks of gneiss have been used. In Madras, beds of hornblende gneiss are largely quarried at Palaveram. Cudappary Choultry, and Pattandalum for the manufacture of articles of domestic use as well as for building purposes. In the Nellore Krishna district it is used in the manufacture of cart wheels.

Except for purely local purposes the construction of bridges &c where the rock nearest at hand has upon economical grounds been made use of this material has not commended itself for building purposes to English engineers. It is however peculiarly susceptible to fine carving and with the exception of some of the trap rocks was the favourite stone for almost all the great temples in Southern India.

See publications of the Geological Survey of India and Journals of the Asiatic Societies of Bengal and Madras.

GNETUM, Linn Gen Pl III, 419

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Gnetum Gnemom, Linn Fl Br Ind V 641 GNETACEÆ

Syn — GNETUM BRUNONIANUM Griff G GRIFFITHII Parlatt

References — Roxb Fl Ind Ed CBC 632 Kurr For Fl Burm II 497 in Flora lv (1872) 350 Gamble Man Timb 293

Habitat — An evergreen shrub or small tree of the Khásia and Manipur Hills extending southwards to Singapore frequent in the dense forests of Southern Tenasserim.

Fibre — 'The BARK is made into strong cords at Sumatra (Roxburgh)

Food — 'The LEAVES are eaten as spinach' (Roxburgh)

FIBRE

Bark

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FOOD

Leaves

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G scandens, Roxb Fl Br Ind V 642 Griff in Trans Linn Soc, XXII, t 55, f 18, 22, 23, and t 56, f 39, 40, 42

Syn — GNETUM EDULE Blume G FUNICULARE Wight Ic t 1955 (not of Blume) G PYRIFOLIUM Miq THOA EDULIS Willd

Vern — Nanu witi SYLHET Kumbal, umble úmbli BOMB Umbruth bald KAN Ula MALAY; Gyutnwb BURM Palta ANDAM

References — Roxb Fl Ind Ed CBC 632 Brandis For Fl 502 Kurr For Fl Burm II 495 in Flora lv (1872) 350 Gamble, Man Timb, 393 Rheede Hort Malab VII t 22 Grah Cat Bomb Pl 1 188 Dala & Gibs Bomb Fl 246 Lisboa U Pl Bomb 174, 273 Agri Hort Soc of India, Journal, IV (Old Series) Ser 264 Bombay Gazetteer, XV, 444

Habitat — A lofty dioecious climbing shrub met with in the Tropical Himalaya from Sikkim eastwards, to Assam, Singapore, and the And

G 311

Gold	(F Murray)	GOLD
man Islands; also in the hills of the Deccan from the Konkan to the Nil ghiris		
Fibre — The STEMS yield a fibre which is employed by the natives of the Andaman Islands for the manufacture of hard fishing nets called <i>Kud</i>		
Food — The SHRUB which flowers in March and April yields an edible fruit in September and October. It is rather larger than the largest olive and when ripe is smooth and orange-coloured. The outer succulent coat or PULP is commonly eaten by the Natives and the SEEDS, when roasted are also employed as an article of food		
Structure of the Wood — Dark brown soft coarsely fibrous porous, rather heavy, but of no use except possibly for rough cordage (<i>Kura</i>)		
Goa Bean, see <i>Psophocarpus tetragonolobus</i> , DC LEGUMINOSÆ		
Goats, see Sheep & Goats		

FIBRE
Stems.
312
FOOD
Shrub
313
Pulp
314
Seeds
315
TIMBER
316

GOLD

Gold, *Ball, Geology of India III 173-230 608 610*

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The colour lustre power of resisting oxidation extreme ductility and malleability of this metal have caused it to be much valued from the earliest ages. In the Bible mention is made of gold and silver ornaments cups shields &c. as abounding in the Court of Solomon and of that king having organised fleets of ships for obtaining these metals from Tarshish and Ophir. It has been conjectured that the latter place may have been some district or port of the Malabar coast. Whether this be so or not abundant evidence exists of the knowledge of gold in India from very remote times. Pliny in A.D. 77 referred to the country of the Nareae as containing numerous mines of gold and silver and that by the Nareae were meant the Nairs of Malabar is now an established fact. Ancient inscriptions shew that in the eleventh century gold existed at least in Southern India in great abundance and numerous and extensive very ancient mines have been described by various writers. In 1596 Linschoten wrote of Ceylon 'It hath likewise mynes of gold silver and other metals' but he makes no mention of having observed or heard of gold mines in the Peninsula of India. In the *Ain-i Akbari* however written at nearly the same date it is stated that although gold is imported into Hindustan it is to be found in abundance in the northern mountains of the country as also in Tibet. Gold may be obtained by the *Saloni* process (washing) 'from the sands of the Ganges Indus and several other rivers as most of the waters of this country are mixed with gold however the labour and expense greatly exceed the profit. This last remark by Abul Fazl very correctly describes the condition of gold washing as an industry in most parts of India at the present day. Thus Ball wrote in his *Economic Geology* 'The amount of gold brought down by the rivers in a single year gives him' (the gold washer) 'insignificant returns'.

though in a country like India where a man can live for so small a sum, it is possible to derive a subsistence such as it is from the washings of a few rivers year after year in succession. Recently, however, gold mining has been revived especially in Southern India with a fair amount of success, and may develop into an industry of some importance. It may accordingly be of interest to give a short résumé of the facts regarding the occurrence and supply of gold in India at the present day.

Vern — Sona HIND; Gser TIBET Sona, swarna MAR; Pwon ponná TAM; Bungárum bungáru TEL Mas amas kanchana MALAY Shawae BURM Run SING Suvarna, swarna, SANS; Tibr sahab ARAB Tilla thul, sir PERS

GOLD

Gold

References — Mallet *Geology of India (Mineralogy)* IV, 1 Ainslie *Mat Ind* I 514 522 U C Dutt *Mat Med Hind* 57 Irvine *Med Top Ajmir* 169, Linschoten *Voyage to the East Indies* I 27 31 109; II 295, Abul Fasl Ain i Akbari (Blochmann's Trans.) 17 30 36-43 (Gladwin's Translation) II 136 Buchanan *Journey through Mysore &c* I 441 Baden Powell *Pb Pr* 12 Atkinson *Econ Geol of N W P* 276 Mason *Burma and Its People* 560 729 Oldham *Mission to Ava* 344 Forbes Watson *Industrial Survey* II 405 W W Hunter *Statistical Acct of Bengal* II 27 75 App 1, III 39 149 XIII 228; XVII 23 167 190 202 259 XIX, 203 *Statistical Acct of Assam* I, 106 380 Balfour *Cyclop* I 1220 Indian *Agriculturist* Oct 22nd 1887 March 22nd April 16th July 13th Nov 9th and 11th 1889 Bosworth-Smith *Rep on the Kolar Gold Field* 1889 *Proceedings of the Rev & Agri Dept for March* 1880 19 and 20 A Brough Smith *Report on Wynaad* 1880 Bruce Foote *Auriferous Rock series in South India* Rec G S I Gasetteers — Mysore and Coorg I 17 34 432 Bhandara *Central Provs* 59 Bombay V 123 VII 40 VIII 261 Punjab Delhi 133 Ambala 11 Gurgaon 14, Jhelam 825 Rawal Pindi 12 Bannu 22 Peshawar 24 Madras Man of Admin II App VI 33 34 Admin Rept Central Provs 124 Bombay 1871 72 373 384, *Settlement Reports* — Central Provs Nagpur Sup 276, Seoni 11 Upper Godavery Dist 42 Chanda 105 Panjab Hasara 9 Peshawar 12 Kohat 32 Consult also the works quoted by Ball *Econ Geology* pp 608-611

OCCURRENCE
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Occurrence — The following account of the localities in which gold is chiefly to be found in India is abridged for the most part from the exhaustive article on the subject in Ball's *Economic Geology* to which the reader is referred for more detailed information

The ultimate derivation of most of the gold of Peninsular India is doubtless from the quartz reefs which occur traversing the metamorphic and sub metamorphic series of rocks but a certain quantity appears to exist in certain chlorotic schists and quartzites and possibly also in some forms of gneiss Existing evidence regarding the relative productiveness of the reefs in the different groups or series of metamorphosed rocks is conflicting probably owing to the fact that a rule which holds good in one part of the country does not necessarily apply to other areas The presence of gold has not yet been proved in any member of the Vindhyan formation but in the next succeeding formation several of the groups included in the Gondwana system are believed to contain detrital gold It is almost certain also that the gold obtained in the Godavari and in its tributary near Godallore or Mungapet is derived from rocks of Kamthi age and the gold of the Ouli river in Talchir (Orissa) is derived from sandstones The only other sources in Peninsular India are the recent and sub recent alluvial deposits which rest on the metamorphic and sub-metamorphic rocks

Passing to the extra-peninsular regions gold is met with in rocks of several different periods In Ladak it occurs in quartz reefs which traverse carboniferous rocks in Kandahar it is found in cretaceous formations as an original deposit connected with the intrusion of trap while all along the foot of the Himálaya the tertiary rocks which flank the bases of the hills are more or less auriferous But the gold occurring in the last mentioned area is all detrital and is doubtless derived from the crystalline metamorphic rocks of the higher ranges which are, from other reasons known to contain gold

MADRAS.
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I MADRAS was in remote times famous for its gold mines and has in recent years attracted much public attention and a large amount of capital in the endeavours that have been made to again open up a long dormant industry Gold is known to exist in Travancore, Madura Salem Malabar, Wynaad Mysore, and Bellary, but according to Ball its occurrence in Vizagapatam is as yet unproved

Gold	(J. Murray)	GOLD
<p><i>In Travancore</i> it is found in outcrops of beds of quartzite including felspar which run with the gneiss but no real quartz reefs occur. Dr W. King in a report to the Travancore Government (1881) stated that in only one case was the outcrop sufficiently large to promise a good tonnage of stone. In the <i>Madura District</i> gold is found according to Mr J. H. Nelson in two localities namely in Palakanuth and in the sands of the Veigei river. Ainslie mentions that an auriferous zinc blende was discovered in some part of the district by Mr Mainwaring. At both these localities gold washing is carried on by natives in a small way barely affording a subsistence to those employed. In the <i>Salem district</i> gold used to be found at the base of a hill called Kanjah Mallia and was obtained from streams in that locality by washing. Heyne refers to some gold mines as existing at Sattergul near Pangumpilly in 1802 the exact locality of which does not appear to be now known.</p>		<p>MADRAS, Travancore 320 Madura. 321</p>
<p><i>Malabar district and the Wynaad</i>—As already stated evidence exists of gold having been obtained in this region as far back as the time of Pliny. In the report of a joint commission from Bengal and Bombay on the condition of Malabar in 1792-93 it is stated that at that time the Raja of Nilambar claimed a royalty on all gold found in his territory. Dr Buchanan in his journey through Mysore &c alludes to the existence of gold mines at Malabar in 1801 and states that a Nair who had the exclusive right to mine paid a small annual tribute for the privilege. Ainslie includes Nilambar Wynaad and the sand of the Beypur river at Calicut in his list of localities for gold. In 1830 a Mr Baber stated before the Lords Committee on East Indian affairs that in Coimbatore and the country west and south of the Nilghiri and Kunda hills 2 000 square miles of soil were auriferous and that at that time the Government derived a revenue from assessing the <i>puttis</i> or trays used to wash the gold. In 1831 the Collector of Malabar furnished a report to Government on the localities in which gold was then to be found and in the same year Lieutenant Nicholson was appointed to prospect the gold fields and also to purchase on behalf of Government. His interesting report was on the whole favourable but in many places referred to the evident jealousy with which his researches and enquiries were received by the natives. He stated however that in his opinion mines might be worked profitably by the British and that the most promising localities appeared to be Cupal and Carembat. After receipt of the report of a Committee in 1833 however which condemned gold working in the low country of Malabar as a European industry the Governor General in Council decided that it would be inexpedient to work the mines. Nothing more appears to have been done for a quarter of a century at the end of which time in 1857-58 letters from the Collector of Malabar again attracted attention to the subject. In 1865 two Englishmen with experience of Australian gold mining were attracted to the district and soon afterwards machinery was erected to crush quartz at the Skull Reef—the first extensive attempt at British gold working in India. Other applicants for the right to mine then came forward and new mines were opened but owing to many and (according to Mr Brough Smith) preventable circumstances, all without success. In 1879-80 Mr Brough Smith explored the Wynaad gold fields and wrote an elaborate and exhaustive report of his investigations in which it was stated that the tract was richly auriferous the average yield of gold per ton at ten reefs or workings being from 6 dwt 13 grains to 18 ounces 9 dwt 1 grain. Omitting picked and exceptional samples which caused the latter very high figure 88 samples from the ten sources yielded an average of 1 ounce 8 dwt 22 grains per ton. Mr Brough Smith deals fully with such important subjects as climate, water and timber supply.</p>		<p>Salem 322</p>
		<p>Malabar 323</p>

GOLD

Gold

MADRAS

&c and in his concluding remark, speaks with confidence as to the future of the industry maintaining that failure can only result from want of care and forethought

Professor Ball concludes his interesting account of the gold in this region by giving an estimate of the cost of working a company on the authority of Mr Ryan As this is stated to be based on actual experience it may prove both useful and interesting and may be here quoted

It being assumed that a concession of value cannot now be obtained at a less cost than £60 000, the following would represent the first year's expenditure —

Price paid for concession	£ 60 000
Cost of machinery 100 stamp heads at £200 each	20 000
One year's working expenses	12 000
Contingencies law expenses &c	8 000

Taking the value of gold at £3 15 per ounce the return from 25 000 tons of stone containing from 3 to 10 dwt of gold per ton would be as follows —

	Total ounces	Value at £3 15	Cost of production *	Profit	Percentage on capital of £100 000
		£	£	£	£
3 dwt per ton	3 750	14 062	11 875	2 187	2 19
4	5 000	18 750	11 875	6 875	6 87
5	6 250	23 437	11 875	11 562	11 56
6	7 500	28 125	11 875	16 250	16 25
7	8 750	32 812	11 875	20 937	20 93
8	10 000	37 500	11 875	25 625	25 62
9	11 250	42 187	11 875	30 312	30 31
10	12 500	46 875	11 875	35 000	35 00

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II MYSORE PROVINCE — Captain Warren in 1802 hearing of a rumour that gold had been found at the Yerra Baternie Hill instituted enquiries which elicited the fact that there were gold washings near the village of Wurigam (the modern Urigam or Ooregaum) and actual mining at Marcurpam He proved the presence of gold in the surface soil and beds of the rivers over an extended area in the neighbourhood of the Manigatta Wullur and Yeldur hills from Budikote to Ramasamudra The people who washed were Dherus or Pariahs and he appears to have thought that agriculture was for them a more profitable profession He then described two mines one at Kembly 30 feet deep having a gallery of 50 feet the other west of Surunpally which was 45 feet deep and 56 feet in extent From the sections given Ball remarks "it is evident that these were not in solid rock but that masses of quartz in an ochreous matrix had been taken out to be crushed" Later Heyne alludes to Warren's researches and various officers appear to have collected samples from the same region at subsequent dates General Sir Mark Oubbon when Commissioner of Mysore, is said to have prohibited more mines being sunk in consequence of the frequency of accidents in those already existing Subsequent to this date little attention appears to have been paid to the subject for nearly fifty years

Of late years however, the gold industry in this province has received a marked impetus and its gradual growth can be traced through succes

* This sum is arrived at as the average of several estimates of cost, 25 000 tons at 9s 6d = £11,875

Gold

(F Murray)

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sive Administrative Reports In 1868 it was stated that alluvial gold was occasionally found near Betmangla, but in too small quantities to repay labour in 1870 washers were said to be able to earn 4 annas a day by working at the foot of the Hemagiri Hill in the Huliyardurga taluk of the Nandidrug division in 1872 73 it was recorded that five pounds weight of gold had been found in the Betmangla taluk and in 1873 74 that six pounds weight had been obtained in Kolar The same year an opinion was expressed that a proper system of working would disclose considerable quantities in certain districts and permission was granted to a Mr Lavelle to prospect for gold and other metals during a period of three years He was informed that leases for a period of twenty years would be granted to him of not more than ten blocks each of two square miles or less in extent As a result of this concession public attention began to be attracted to the Kolar gold fields and since the year 1880 several companies have started in the district and have crushed and sent home gold In 1889 Mr Bosworth Smith Government Mineralogist of Madras issued a long and instructive report on the Kolar gold field to which the reader is referred for a complete description of the Geology and Mineralogy of the district His concluding remarks may be here quoted as they are of much interest and sum up comparatively briefly his opinions regarding the future of the industry There can be no doubt, he writes that the Kolar gold field has a future before it But that the expectations that were first started when gold mining in India was revived in 1880 will ever be realised in this (or any other gold field in any part of the globe) is very doubtful Some of the mines are now paying expenses and there can be no doubt that managed economically and under scientific supervision several others should easily pay their way at an early date If regular dividends are to be paid it will be found that prospecting work must be kept going side by side with the more pleasant task of stamping and crushing what pay stone has already been found It will not do after finding a pay shoot to concentrate all the energies of the mine on getting out that shoot and rushing it through the stamps to find after taking all its quartz that has been left by the 'old men' above 400 feet that the rich shoot is getting out of control and that it must practically remain untouched whilst a new shaft is sunk to cut the shoot lower down It would be invidious to take each mine separately and write on its merits and demerits but it can do no harm to mention the names of some of the best mines That the oldest mines are the best is due to the fact that they have been more thoroughly prospected and that when the field was started the number of old workings on a block were taken (and very rightly too) as an indication of its value The Oorghaum and Mysore mines contain a great number of large old workings and without doubt these are the pick of the mines Balaghat has a rich shoot opened out for over 200 feet and Nundydrug has been returning an average of about 400 ounces per month for some time past The mines that have crushed and sent home gold are the nine reefs Balaghat Nundydrug Oorghaum Mysore Indian Consolidated (Kolar Section) Mining Companies and the South east Mysore Company is expected to crush very shortly It may be remarked however that certain authorities in Madras hold a much higher opinion of the probable success of these mines than appears to have been entertained by Mr Bosworth Smith and that Mr Bruce Foote FGS, in a recent paper contributed to the *Records of the Geological Survey of India* has also taken a more favourable view of the subject In one passage he writes, the great success attained at a good number of the mines now being worked there has proved beyond all cavil, that gold does exist in richly paying quantity in many of the lodes running through the Dharwar schists" (the Kolar Gold

GOLD	Gold
MYSORE	<p>Field Band) and I for one firmly believe that lodes of equal richness will be found in other tracts in which similar geological conditions prevail. In another passage he writes the results already obtained at Kolar are abundantly good enough to encourage sensible people to proceed with care and forethought to open other mines'. In his opinion the gold mining operations at present conducted, have only to a very small extent tapped the gold bearing rocks of Mysore. Over the whole extent of the province from north to south run well marked bands of Dharwar schists, which all bear evidence of having been worked to a greater or lesser extent by Natives in remote times. The Kolar band does not belong to these well marked great bands of Dharwar, but is an outlier of limited extent. Of the great bands traversing Mysore the western is said by Mr Foote to be the largest and least known being covered by the dense forests and steep hills of the Western Ghâts.</p>
HYDERABAD 325	<p>III HYDERABAD — Gold-dust is found in the bed of the Godavari and its tributaries and appears to have been fairly extensively worked up to the end of last century at that time however operations ceased owing to an excessive rent charged by the Raja. According to Dr Walker there was a gold mine about 1790 near the village of Goodloor or Godalore in the vicinity of Mungapet but Ball points out that owing to the absence of crystalline rocks in the neighbourhood it is improbable that there ever was a real mine there.</p>
BENGAL. 326	<p>IV BENGAL — Gold is obtained in Orissa Midnapur Bankura and in the Province of Chutia Nagpur the last mentioned locality being apparently specially rich in the metal.</p>
Orissa 327	<p>Orissa — Ball states that within the limits of the Province of Orissa gold washing is or has been carried out in the Native States of Dhenkanal Keonjhar Pal Lahara and Talchir. It is a poor pursuit as in so many other parts of the country but the fact is interesting as affording evidence of the existence of gold. At the present time gold washing is carried on most actively in the Brahmini river where it traverses Pal Lahara.</p>
Midnapur 328	<p>Midnapur district contains a few professional gold washers who apparently carry on their industry in the beds of the Kasai river and its tributaries.</p>
Bankura 329	<p>Bankura district — Gold is reported to have been obtained in very small quantities in the sands of the Dalkissur at Bankura.</p>
Chutia Nagpur 330	<p>Chutia Nagpur — Ball writes From the characters of the rocks found in the sub-divisions of this province it is not improbable that gold occurs in all of them whether because it is less abundant in some as is probable or because it has never been properly searched for the fact is certain that in others there is greater attraction for the indigenous gold seeker. Judged by this standard the richest tracts are situated in Manbhum Singhbhum, Gangpur Jhanspur and Udaipur. That these or some of them may yet be the scene of extensive operations should the gold mining in Southern India be successful is very possible. The indications afforded by the alluvial deposits of sources of gold existing in the rocks over several large areas are perhaps quite as striking in their way as those which led to the starting of the gold mining industry in Southern India. Quartz or reef mining and crushing however can scarcely be said to have been tried in this area but one solitary and not very expensive attempt having been made. It is stated that three companies have lately (1890) started for gold working in this province and that a probability exists of two or three other companies being formed for the same purpose.</p>
Manbhum 331	<p>In Manbhum the localities where gold bearing sands exist are very numerous indeed, in the southern half of the district gold is to be found in nearly every stream. Ball discovered by a systematic application of</p>

Gold.	(F Murray)	GOLD.
<p>the operations of two gold washers that the area in which gold was most abundant corresponded with a tract in which a particular series of rocks was found to occur. These rocks were sub metamorphic, consisting chiefly of magnesian and mica schists, slates and quartzites. They almost exclusively prevail south of a line drawn from Simlapal on the east through Bara Bazar to a point a little north of Ichagarh on the west and so on into the Chutia Nagpur highlands. In Manbhum however the metamorphic rocks also contain gold but in much smaller quantity.</p>	<p>In <i>Singbhum</i> the metal occurs in the same series of sub-metamorphic rocks which runs continuously into this district from Manbhum. It is not found at all however in the metamorphic rocks. In this district, quartz reefs are more abundant than in Manbhum and in all probability contain gold. Indeed Ball states that the only nugget seen by him from the district was in a quartz matrix and that gold is said to have been obtained by quartz-ru hing at Landu. The same writer enumerates the following as the most noteworthy gold bearing localities in Singbhum — Kamerara the Kapargadi Ghât in Dhalbhum, Landu in Seraikela, Asantoria in Kharsa, wan Sonapet, Porahat and Dhupa in Sarunda. Of these Sonapet or the mother of gold is referred to by all writers on the district as the richest in the metal. Records however exist of gold washing to a greater or lesser extent in the streams of all the localities.</p>	<p>BENGAL. Chutia Nagpur</p>
<p>In the <i>Lohardaga district</i> the Kanchi river contains auriferous sands probably derived from the same series of sub-metamorphic rocks as that above described. As already mentioned gold occurs and is washed for in the Brahmini river in Bonai. In <i>Gangpur State</i> gold washing is carried on in the bed of the Ebe and in some of its tributaries particularly the Icha. Gold mines, in which large pieces of the pure metal were said to have been found were also reported by Surgeon Breton to exist in the state (<i>Medico Topography of Ceded Provinces 1826</i>).</p>	<p>Many records exist of gold in <i>Jashpur State</i> in some cases large nuggets having been found. In the early part of this century mines appear to have been worked by the Raja but owing to an accident in one of the shafts operations were discontinued. In later years the ancient deposits have been considerably worked by gold washers who find them more profitable than the sands of the river beds. Ball writes of these. On both sides of the river Ebe or Ib there are tracts at some distance from the banks which are honey combed with shafts sunk by successive generations of gold seekers. These shafts are from 10 to 30 feet deep. The gold bearing stratum is a layer of pebbles and fragments of quartz which underlies red soil and vegetable humus. The stuff selected is of a dirty drab or reddish colour with occasional balls of decomposed felspar which latter are regarded as the surest indication of the presence of gold. The decomposed granitic rock on which this layer reposes is not generally washed but Colonel Dalton found that it was likewise auriferous but to a less degree. The outturn by the native method of simple washing was according to Colonel Dalton, very uncertain no mercury was used only the visible gold being saved. Gold was sent by Colonel Ousely from Phrashabahal to the mint for assay and a nugget from some other part of Jashpur was presented to the Geological Survey Museum by Colonel Dalton. The latter specimen weighed on receipt 221.87 grains and after cleaning 199.6 grains and contained 94.6 per cent of the pure metal. Ball concludes his account of the Jashpur State with the following remarks. The facts just given and those mentioned below with reference to the states of Gangpur and Udaipur establish, beyond a possibility of doubt, the existence of an ancient alluvial gold bearing deposit at intervals throughout a tract of not far short of 2 000 square miles in area. ' ' The principal rivers of this tract</p>	<p>Singbhum 332</p>

GOLD	Gold
BENGAL	are the Mand and Ebe, with their numerous tributaries. As there is always water in the Ebe it is possible that some system of hydraulic mining might be applicable. Be that as it may, there cannot but be gold bearing reefs from which all this gold has been derived.
Udaipur 333	In <i>Udaipur State</i> also the rivers contain auriferous sands. The first to call attention to the washings in this state was Colonel Ousely in 1847 at which time he reported that three families at Rabkob obtained a livelihood by the industry. In 1849 a Mr Robinson took a lease of the village with permission to work the mines from Government and found as the result of his trials that a man to whom he paid 1 anna could earn for him 3 to 4 annas worth of gold. The gold obtained was valued at the Calcutta Mint as worth Rs 14½ per tola. The unhealthiness of the district for Europeans appears however to have resulted in the cessation of the enterprise. In 1865 the number of native gold washers was stated to have increased to six families and the reporter (the late Colonel Dalton) wrote that the production of gold was only restricted by the number of washers.
CENTRAL PROVINCES 334	V CENTRAL PROVINCES—Gold bearing sands occur in most parts of these provinces wherever there are exposures of the older crystalline rocks. Judging by the census returns of 1872 Nagpur division is the richest followed by Jabalpur and Chatisgarh while in the Nerbada division none of the inhabitants were returned as gold washers.
Chatisgarh 335	<i>Chatisgarh Division</i> —In the district of Sambalpur gold washing is pursued as an industry at Sambalpur town on the Mahanadi and at the village of Tahud on the Ebe. In the Bilaspur district gold is known to occur in the Jonk river at Sonakhan. In the Raipur district 12 gold washers were returned in the 1872 census though it is not known in what localities they pursue their avocation. It has been asserted however that gold is procurable in the Mahanadi at Rajoo (probably Rajim is meant by this name).
Nagpur 336	<i>Nagpur Division</i> —In the Bhandára district gold bearing sands occur in streams near Ambagarh and Thirora. In these waters gold washing operations are carried on and in some places mercury is employed in separating the finer particles. In the Chándá district the search for gold is said to be carried on in the eastern parts of the area but there are no definite details as to the actual streams in which the metal is found. Gold is washed in several places in the Bálághát district the auriferous streams being chiefly situated in the Lanji and Dhansua Parganas. Of these the Son and Deo are richest in the metal. The census returns of 1872 give 103 gold washers in the Nagpur district but it is probable that these men carry on their operations chiefly in the adjoining districts.
Jabalpur 337	<i>Jabalpur Division</i> —In the district of Wardhá Sagar and Dámoh returns are made of some 52 gold washers though there is no record of the occurrence of gold in these localities. The sands of the Parqudhur stream in the Seoni district however produce gold. Balfour states that the washers of the sands of this river consider it unlucky to make more than 4 annas a day as they believe that the goddess who makes the gold would leave the locality if they exceeded that amount.
Upper Godavari 438	In the <i>Upper Godavari District</i> gold is said to be found in two localities namely near Bhadrachellum and at Marigudem or Mariguram. The gold of the latter locality is of superior quality being valued at Rs 16 a tola yet notwithstanding this fact the work of washing is said in the <i>Central Provinces Gazetteer</i> to be barely remunerative. It must consequently be inferred that the metal occurs in small quantity only. Gold washing is also carried on in the Bastár State at Pratappur or Partabpur, and at Bharamgarh.
CENTRAL INDIA 339	VI CENTRAL INDIA— <i>Ajmer Merwara District</i> —According to Dr

Gold	(F Murray)	GOLD
Irvine, gold dust was at one time found in the sands of the Luni and Khari rivers but the industry does not appear to be carried on at present		CENTRAL INDIA
VII BOMBAY—Auriferous rocks are reported to occur in the districts of Dharwar Belgaum, Kaladgi in the Southern Mahratta Country, and in the province of Kathiawar		BOMBAY 340
<p><i>Dharwar District</i>—Gold has been found at Chik Mulgund Surtur Dambal Dhoni and in the Hurt river near Guduk Mr Foote in the <i>Records of the Geological Survey of India</i> has given a <i>résumé</i> of the writings of other authors on the subject of gold in this district together with his own observations He considers that the rocks of the known gold bearing area belong to three groups or series each characterised by certain peculiarities To these he has given the local names of Dhoni Kappatgode and Surtur The Dhoni series consists of a hematitic schist accompanied by chloritic hornblende and micaceous schists, and includes several beds of white and grey limestone, which might prove a valuable source of lime The second group lies immediately above the first and forms the Kappatgode hill It also consists of hematitic schists which however have associated with them argillaceous schists and instead of having a green prevailing colour as is the case with the first group are reddish buff or mottled white The third group consists of hornblende and chloritic schists intimately associated with a massive diorite In all these series quartz reefs occur but according to native opinion only the streams arising from the Surtur series contain auriferous sands and it is certain that the richest of all the Surtur river lies entirely within the area occupied by the chloritic schists and diorite The quartz reefs in this section have with few exceptions been broken up by gold seekers; and in the Kappatgode quartz reefs also indications exist of workings at some past date At the present time only a few families are engaged in gold washing in Dharwar and it appears probable that the unfavourable view taken by Mr Scholt of the value of the alluvial deposits in the district was a just one During the Bombay share mania however a Gold Company was started to work the locality and apparently sank two shafts—one in the Dhoni and one in the Kappatgode series</p>		Dharwar 341
<p><i>Belgaum District</i>—Gold dust is said to have been found within the limits of this district at or near the villages of Belowuddi Byl Hongul and Murgur The quantity must however be small since very few gold washers pursue their calling in the district</p>		Belgaum 342
<p><i>Kaladgi District</i>—Mr Foote mentions a report of auriferous sands being found in the streams of this district but adds that he has reason to doubt the accuracy of the statement</p>		Kaladgi. 343
<p><i>Kathiawar</i>—Gold-dust in small quantities is said to be found in the Sourekha (a small river rising in the Girnar hills) also in the Aj which passes Rajkot</p>		Kathiawar 344
<p>VIII PANJAB—Ball writes It has been not unfrequently stated that all the rivers of the Panjab the Ravi alone excepted contain auriferous sands Probably there are some others which might be excluded from so general a statement but the fact remains that the rivers and streams of the province whether rising in the distant ranges of crystalline rocks forming the axis of the Himálayas or merely having their sources in the outer and lower ranges of hills formed of detrital tertiary formations do as a general rule contain gold In the latter cases the gold must have a doubly derivative origin and no veins, or other original deposits of it, can be expected to occur</p>		PANJAB 345
<p>The practice of gold washing in this province is probably of considerable antiquity formerly it afforded a source of revenue indeed during the Sikh predominance, the tax amounted to one fourth the gross produce This</p>		

GOLD	Gold
PANJAB	<p>revenue has, however here as in most other parts of India dwindled down to very small proportions or become totally extinct In 1860-61 it was R444 and in 1861-62 R530 Abul Fazl mentions that in the time of Akbar gold was obtained by washing in rivers in the <i>subah</i> of Lahore. Ball states that the districts it is at present found are Bannu Peshawar, Hazara Rawal Pindi, Jhilm Amballa and certain Native States and gives the following detailed information regarding each</p>
Bannu 346	<p><i>Bannu District</i>—Gold dust is obtained from the Indus at and below Kalabagh to the annual value of about R200 It is doubtful whether the source of the metal is the low tertiary rocks or the older rocks higher up the valley</p>
Peshawar 347	<p><i>Peshawar District</i>—About 150 men wash for gold in the Indus above Attock and in the Kabul river during part of the year their regular avocation being that of boatmen Each man is said to obtain on an average about 2 to 2½ tolas of gold which sells for about R15 a tola Ball calculates from the time spent in collecting, that this amount only yields a daily wage of about 2 annas</p>
Hazara. 348	<p><i>Hazara District</i>—Here as elsewhere the Indus yields a small quantity of gold dust which is similar in quality and value to that obtained in the Peshawar district</p>
Rawal Pindi 349	<p><i>Rawal Pindi District</i>—The sands of the Indus between Attock and Kalabagh are washed for the metal Dr Jameson in 1843 stated that about 300 individuals used then to engage annually in the search for gold in this region employing large wooden troughs and mercury that one fourth of the proceeds was claimed by the Sikh Government and that the actual earnings of the men were estimated to be from 3 to 4 annas a day Within the last few years it is believed endeavours have been made to establish washings on the Ravi and in other parts of the Rawal Pindi district on a large scale The experiment was not however financially successful</p>
Jhilm 350	<p><i>Jhilm District</i> contains most of the gold washings of the Salt Range These are situated in the beds of rivers and streams arising from the lower Siwalik group the detrital beds of which yield the metal Ball states that much of the gold is invisible or nearly so and would be lost but for the employment of mercury Under the Sikh Government about 160 cradles were worked and afforded a revenue of over R500 Baden Powell quoting Dr Flemming gives the annual production from these washings in 1848 as 1,013 tolas or about £1 600 The Bunhar river is specially mentioned by Mr Wynne as gold producing and Ball states that from it westwards up to the Indus many of the streams which rise on the northern flank of the range contain gold</p>
Kangra 351	<p><i>Kangra District</i>—Gold is found in the Bias near Haripur and also in Spiti Kulu and Lahul but nowhere in large quantity</p>
Amballa 352	<p><i>Amballa District</i>—Specimens of gold from the Markunda river were exhibited at the Lahore Exhibition and records exist of gold washing having been carried in the neighbouring stream the Gumti from which the Raja of Nahan at one time derived a small revenue Balfour mentions but on what authority he does not state that gold has been found in large quantities between Amballa and Kalka</p>
Gurgaon 353	<p><i>Gurgaon District</i>—Gold is said to be found in the streams near Sonah</p>
KASHMIR. 354	<p>IX KASHMIR—Abul Fazl states in the <i>Ain-i-Akbari</i> that gold was found in the time of Akbar, in Padmatti Puckely and Gulikut (? Gilgit) of the Subah of Kashmir and describes a peculiar process employed in obtaining it. This consisted in pegging down the skins of animals in the beds of gold-bearing streams The hair on the skins acted like the blanket used by miners in modern days by arresting small particles of gold, which were</p>

Gold

(J Murray)

GOLD

shaken out after drying the skins. Though there is apparently little doubt but that gold was at one time obtained in Kashmir proper few authentic records exist regarding it. At the present time in the territories of the Maharajah of Kashmir the industry appears to be almost confined to Ladak. Mention however is made by Dr Bellew of an old deserted mine in auriferous sand at Kargil which had been given up in consequence of a portion of it having fallen in and killed some of the men employed. Gold washing is said to be carried on in Ladak in the beds of the Indus and Shayok and at Kio on the Markha river.

X TIBET—Though this country is not within the limits of India a short account of the gold obtained from it may be here given since there is every reason to believe that for many centuries it has been the source of a regular supply to this country. The survey parties of 1867-68 discovered the existence of large gold fields at Thok Jalung (in the province of Nari Khorsam) Thok Nianmo and Thok Sarlung which were regularly worked by large encampments of Tibetan miners. One of the Pandits accompanying the expedition gave an interesting account of the habits and methods of work of these miners one of the passages from which may be here quoted as throwing a light on the old story of gold-digging ants.

The cold is intense and the miners in winter are thickly clad with furs. They do not merely remain under ground when at work but their small black tents which are made of felt like material manufactured from the hair of the yak are set in a series of pits with steps leading down to them seven or eight feet below the surface of the ground.

Spite of the cold the diggers prefer working in winter and the number of their tents which in summer amounts to 300 rises to nearly 600 in winter. They prefer the winter as the frozen soil then stands well and is not likely to trouble them much by falling in.

Sir Henry Rawlinson and Professor Schiarn commenting on these observations arrive at the conclusion that the old tradition of gold digging ants mentioned in the writings of Herodotus Pliny &c of the middle ages and of Arabian authors, owes its origin to these Tibetan miners. The latter learned writer remarks for us the story partakes no longer of the marvellous. The gold digging ants were originally men of flesh and blood and these men Tibetan miners whose mode of life and dress were in the remotest antiquity exactly what they are at the present day.

The likelihood of this explanation being correct is strengthened by the fact that according to ancient writers the ants worked chiefly in winter. Further Pliny states that the horns of the Indian ant were preserved in the temple of Hercules at Erythrae. Professor Schiarn argues that these may have been horns taken from the fur dress of the miners. Ball thinks they may have been more probably the horns of *Ovis vignei* which were probably in ancient times as they are to this day tipped with iron and employed as pick axes by the miners.

The gold obtained by the Tibetan miners is tied up in little bags called *Sar shu* weighing about 90 grains which form the heavy currency of the country. It is chiefly given in exchange for grain or cloth and forms an important source of the metal in northern India. The mines are farmed or managed by a *Sar pan* or gold commissioner who holds a triennial contract direct from Lhasa. Atkinson states that the gold of the Thok Jalung mines has usually not more than 773 specific gravity and that even the picked yellow grains have only a specific gravity of 1196 showing that they are alloyed with some other metal.

XI NORTH WEST PROVINCES—Gold bearing sands occur in some of the rivers of Kumaon and Garhwál also as in Panjáb, in some of those which take their rise in the outer ranges of hills formed of tertiary rocks. Several of the rivers of the Moradabad district used formerly to be

KASHMIR

Ladak
355

TIBET
356

N W P
357

GOLD	Gold
N W P	<p>washed if they are not so still. Gold washing was a source of revenue to the Gurkha Government but when the country became British territory the smallness of the sum realised caused it to be remitted by the Commissioner. Mr Ravenshaw states that in 1833 the gold washers or <i>Nariyas</i> of Kot Kadir paid Rs 50 a month and those of Barapura Rs 30 to the zamindar while on the Dhela river a tax of Rs 8 was levied by the Government on each washing trough.</p>
Garhwal 358	<p><i>Garhwal District</i>—The Alakananda, Benigunga and Sona rivers contain auriferous sands probably all doubly derivative though an observer is said to have found a speck of gold in granite at Kedernath near one of the sources of the first mentioned stream. The Ganges where it traverses the outer zone of tertiary rocks in Chandī also contains gold.</p>
Moradabad 359	<p><i>Moradabad District</i>—Gold-dust is to be found in the tributaries of the Ramgunga along the northern frontiers of the district especially in the Koh and the Dhela.</p>
NEPAL & 360	<p>XII NEPAL, DARJILING & SIKKIM—Though no definite information exists of gold being obtained in these localities there is no reason for doubting that it exists under similar conditions to those prevailing in the North West Himalaya. Gold imported from Tibet is said however to be refined in Nepal to the value of 2 lakhs a year. It appears probable that the want of definite knowledge of gold in Sikkim and Nepal is at least partly due to the anxiety shown by Native Governments to conceal their wealth, a suspicion which is confirmed by the fact that gold does exist and is actually washed for in Champaran district at the foot of the hills.</p>
Champaran 361	<p><i>Champaran District</i>—May be considered in this place since from a geological point of view it is closely connected with the tract above described. A number of rivers and streams which rise from the outer ranges of tertiary rocks on the borders of this district and Nepal are known to be auriferous and their sands are annually washed at the commencement and termination of the rains in the Pachnad, Hurha, Balui or Dhar, Achni and Kapan rivers. Notwithstanding the absence of actual knowledge of the occurrence of gold in Nepal, Ball holds that the metal in these outer Siwalik rocks must as elsewhere in the Himalaya, be of detrital origin, derived from the higher ranges of crystalline rock. The gold washers of Champaran are evidently of Mongolian origin. They earn it is said from 4 annas to 1 rupee a day but this estimate which gives a higher average than in almost any other part of India may be too high.</p>
ASSAM 362	<p>XIII ASSAM—Ball writes. Assam has long been famous for the production of gold and not a few authorities have stated that its rivers contain gold bearing sands, some however limiting this general statement to those which rise on the hills to the North. Shorn of all exaggeration it would seem that there are few if any named rivers or streams in the districts of Darrang, Sibsagar and Lakhimpur which do not yield gold while in eight other districts, namely Goalpara, Kamrup, Nowgong, the Garo, Jaintia and Naga Hills, Sylhet and Cachar there is no gold as far as our sources of information go. That it is wholly absent in all is not likely but it is not and does not, appear ever to have been sought for successfully in any of them. Most of the metal found in the first three localities is doubly derivative coming from the disintegration of detrital rocks but in the upper reaches of the Brahmaputra it is probably derived direct from the crystalline rocks. Ball gives a long and interesting account of the history of gold in Assam and the methods of washing employed in former times to which the reader desiring such information may be referred. Suffice it to say in this place that before British occupation, the <i>Sonwals</i> or gold washers paid a yearly tribute of some Rs 64,000 this sum according to Colonel Hannay, representing at least 10,000 <i>Sonwals</i>.</p>

Gold	(7 Murray)	GOLD
<p><i>Sibsagar District</i>—The principal auriferous rivers of this district are the Dhaneswarī with its tributary the Pakerguri the Desue the Jangī and the Buri Dihing Colonel Hannay states that 15 men working 12 days in each of the first three rivers obtained 7½ tolas of gold while 24 men working for one month in the last obtained only 12 annas weight The gold obtained in the Desue in this district and the Joglo in Lakhimpur had at one time the reputation of being the best in Assam and the gold ornaments of the Assamese Royal Family is said to have been made entirely of the metal obtained from these sources</p>		<p>ASSAM Sibsagar 363</p>
<p><i>Lakhimpur District</i> contains a greater number of named auriferous streams than the whole of the rest of Assam put together In 1853 Colonel Dalton reported the total yield of the district to be about 20lb per annum worth say about £1 200 The chief auriferous streams of the district are the Brahmaputra with its tributaries the Dikrang Borpani Subanshiri Sisi Dihong Dibong and Digara on the North and on the South the Joglo and Noa Dihing The gold washings of these streams were examined by Colonels Dalton and Hannay some years ago The best results were obtained in the Soglo from the alluvial deposit of which 18 grains per ton of rubble washed was obtained The Noa Dihing was proved to be more productive than the Brahmaputra, and in this stream traces of platinum were found along with the gold</p>		<p>Lakhimpur 364</p>
<p>XIV BURMA—Gold is found in all the divisions of Burma in some instances apparently directly derived from crystalline rocks in others of doubly derivative origin In Upper Burma as in Assam the latter is most frequently the case</p>		<p>BURMA 365</p>
<p><i>Pegu Division</i>—Mr Theobald in the publications of the Geological Survey of India states that gold was at the time of his report occasionally washed for in the sand of the Irrawadi opposite Prome but he himself only saw the operation being conducted at Shwe Gyeng in coarse gravel</p>		<p>Pegu 366</p>
<p><i>Tenasserim Division</i>—In this area gold is reported by several observers to be found in the Shwe Gyeng Moot ta ma and Tsit tounge rivers in the streams falling from the granite ranges between Tay and Moungmagan and in the waters of Henzai Tavoy and Tenasserim Evidence exists of old gold workings in many of these localities and in 1867 an Australian miner aided by Government attempted to obtain gold in the Moot ta ma and Baw ga ta but without pecuniary success</p>		<p>Tenasserim 367</p>
<p><i>Upper Burma</i>—The use of gold in Burma both for ornamenting buildings and as jewellery is universal but is perhaps more prominent in Upper Burma Though a portion of the metal is obtained by washings in the country by far the greater amount is imported from China In 1855 the imports were estimated at an average of 1,100lb and the indigenous gold which was brought to Mandalay at 300lb making a total annual consumption of 1,460lb The principal sources of native gold in Upper Burma are the Kapdup and Nam Kwan rivers in the Hukong Valley the Kyendwen and the Upper Irawadi In the Kyendwen river platinum also occurs and both metals are collected by a peculiar process Horns of the wild cow with the hair on are fixed in the river, till charged with spangles and are then sold</p>		<p>Upper Burma 368</p>
<p>Method of Collection</p>		<p>COLLECTION 369</p>
<p>It is unnecessary in an article such as the present to enter into the various methods employed in various parts of the world for obtaining gold by washing, quartz crushing &c It may be of interest however to give a short account of the general method pursued by native gold washers with a few exceptions in every part of India in which gold is to be found The following short description of the practice followed in the</p>		<p>G 369</p>

GOLD	Gold
COLLECTION	<p>Singhbhum District of Chutia Nagpur has been selected by Ball as typical and may be here quoted — Each tribe occupies a distinct tract and poaching on one another's favourite streams is not indulged in to any great extent. The wooden dish used for washing measures on an average about 28 by 18 inches for the men, smaller ones being used by the women and children amongst the Jhoras. The dish is hollowed somewhat eccentrically to a maximum depth of $2\frac{1}{2}$ inches. A scraper formed of a flattened iron hook set in a handle is used to collect the auriferous sand and gravel which accumulates in the angles formed by the rocks in the bed of the stream. The dish when filled is placed in shallow water and the operator working with his hands soon separates and throws aside all the coarser gravel and stones whilst the agitation of the water serves to carry away all the mud and lighter portions. The dish is then balanced on the palm of the left hand and oscillated to and fro with the right, this serves to throw off the greater portion of the remaining gravel and the process is completed by a circular motion which is communicated to the water in the hollow of the dish by which even the smallest particles of foreign matter is separated and the final result is a residue of black iron sand in which the specks of gold are readily apparent but as mercury is not employed in this part of the country all the very small and invisible gold is lost. As already stated this process is supplemented in some parts of the country (e.g. the Panjáb) by the employment of the amalgam method with mercury in others skins horns &c. are placed in the stream to mechanically arrest fine particles of gold and in Assam moss and slime scraped from the beds of the streams are similarly used. An idea also prevails in Assam that gold can be obtained by burning the leaves of a plant known as the <i>copat</i>. A somewhat peculiar system exists in the washings of the Ningthi river on the Burma Manipur border.</p> <p>The sand and gravel is first placed on a sieve the finer parts being allowed to fall through on to a hollowed plank 4 feet long and $2\frac{1}{2}$ feet wide at the upper end and $1\frac{1}{2}$ feet at the lower which is open the top and margins being protected by a rim $\frac{1}{2}$ inch high. The lower half is cut into grooves half an inch deep and the same in width. The fine sand caught in these grooves is washed in a wooden dish resembling a shield in shape which has a polished black internal surface and a receptacle in the centre. Placed floating in water it is revolved till all the sediment is removed and the mere sand and gold are alone left remaining.</p> <p>Medicine — Gold was in remote times employed as a medicine in Europe and is to this day largely used by followers of Sanskrit medicine. Pliny informs us that in his time it was considered a sovereign remedy for green wounds that it was supposed to destroy warts and that Roman mothers hung it round the necks of their children to ward off the evil effects of sorcery. By Sanskrit physicians it was supposed to be a valuable tonic and alterative to increase strength and beauty to improve the intellect and memory to clear the voice and to increase the sexual powers. These imaginary properties are still largely believed in and gold is now as it was centuries ago much administered in Hindu medicine. Pure leaf gold is employed purified by heating and cooling it alternately with <i>Kanjika</i> oil cows urine butter milk and a decoction of horse-gram. It is then reduced to powder by being rubbed with mercury and exposed to heat in a covered crucible with the addition of sulphur and is in this form administered in doses of 1 to 2 grains. It enters into many complicated medicinal compounds each of which is supposed to have some specific virtue. An exhaustive and interesting account of these will be found in <i>U C Dutt's Hindu Materia Medica</i> from which the above abstract of the Indian methods of employment as a medicine has been mainly compiled.</p>

MEDICINE
370

Gold ; <i>Gordonia</i>	(J Murray)	GORDONIA obtusa
<p>Domestic and Sacred — Gold is largely employed by the richer classes in India for purposes of personal adornment and also in the decoration of buildings. It is unnecessary in an article such as the present to enter into a consideration of the several art industries such as gold jewellery filigree work gold wire thread and lace &c for interesting and exhaustive descriptions of which the reader may be specially referred to the volumes of the Journal of Indian Art.</p>		DOMESTIC 371
<p>Trade — The average imports of gold and bullion during the five years from 1883-84 to 1887-88 was Rs 88,17,962 the average exports Rs 26,83,717. The countries from which the metal was chiefly imported were the United Kingdom, China, Australasia and Egypt. In 1887-88 Rs 95½ lakhs were received from the first, 97 lakhs from the second, 54 lakhs from the third and 20 lakhs from the last mentioned country. The gold exported is almost entirely sent to the United Kingdom.</p>		TRADE 372
<p>GOMPHERIA, Schreb. <i>Gen Pl I</i> 318 Gomphia angustifolia, Vahl, <i>Fl Br Ind I</i>, 525, OCHNACEÆ</p>		373
<p>Syn — GOMPHERIA ZEYLANICA DC. G. MALABARICA DC. OCHNIA ZEYLANICA Lam. WALKERIA SERRATA Willd. MEESIA SERRATA Gartin. Vern — Valermam: MALAY Bokaara gass SING. References — Gamble <i>Man Timb</i> 65. Thwaites <i>En Ceylon Pl</i>, 71. W and A <i>Prod</i> 152. Grah <i>Cat Bomb Pl</i> 38. Rheede <i>Hort Mal</i> V. tt 48, 52. O'Shaughnessy <i>Beng Dispens</i> 269. Lisboa <i>U Pl Bomb</i> 37. Balfour <i>Cyclop I</i> 1227.</p>		
<p>Habitat — A small glabrous tree native of South Western India from the South Konkan to Travancore, Singapore and Ceylon. Distributed to China.</p>		
<p>Medicine — O'Shaughnessy states that the ROOT and LEAVES are bitter and are employed in the form of a decoction in Malabar as a tonic, stomachic and anti-emetic.</p>		MEDICINE. Root 374
<p>Structure of the Wood — Used for building purposes in Ceylon. (Thwaites)</p>		Leaves. 375 TIMBER 376
<p>Gomuti, see <i>Arenga saccharifera</i>, Labill. VOL I 302</p>		
<p>GONIOTHALAMUS, Blume <i>Gen Pl I</i>, 26 Goniiothalamus cardiopetalus, Hf & T, <i>Fl Br Ind I</i> 75 [Beddome <i>lc Pl Ind Or</i>, t 62, ANONACEÆ</p>		377
<p>Syn — UVARIA OBOVATA Heyne. POLYALTHIA CARDIOPETALA Dals. ATRATEGIA THOMSONI Bedd.</p>		
<p>Habitat — A small tree found on the mountains of Kanara.</p>		
<p>Structure of the Wood — Used for making posts. (Lisboa <i>U Pl Bomb</i> 3)</p>		TIMBER 378
<p>Gooseberry, see <i>Ribes Grossularia</i>, Linn. SAXIFRAGACEÆ</p>		
<p>Gooseberry, Cape, see <i>Physalis peruviana</i>, Linn. SOLANACEÆ</p>		
<p>GORDONIA, Ellis, <i>Gen Pl I</i> 186 Gordonia obtusa, Wall. <i>Fl Br Ind I</i> 291. Wight <i>Ill I</i>, [99, TERNSTROMIACEÆ</p>		379
<p>Syn — GORDONIA OBTUSIFOLIA, and G. PARVIFOLIA Wight; SAURAUJA CRENULATA Wight in Wall <i>Cat</i> 1469 (not of DC.)</p>		
<p>Vern — Nagetta NILGHIRIS</p>		
<p>References — Beddome <i>Fl Sylv</i> t 83. Gamble <i>Man Timb</i> 28. Drury, <i>U Pl Ind</i> 229. Lisboa <i>U Pl Bomb</i> 14. Balfour <i>Cyclop I</i> 1236. Ind <i>Forester II</i>, 22, 23. X 35, 552.</p>		

